तार : विश्वविद्यालय
Gram : UNIVERSITY

टेलीफोन : कार्या0 : 2320496
कुलसचिव : निवास : 2321214
फैक्स : 0510 : 2321667

बुन्देलखण्ड विश्वविद्यालय, झाँसी
BUNDELKHAND UNIVERSITY, JHANSI

झाँसी (उ.प्र.) 284128

संदर्भ...BU/IFSC/22/041 दिनाँक 29/4/2022

The Minutes of Meeting of BOS

In reference to the BOS of Dr. A. P. J. Abdul Kalam Institute of Forensic Science and Criminology held on 25th June 2022 regarding the revision of syllabus of B.Sc. (H.) Forensic Science and M.Sc. Forensic Science and Criminology in tune with CBCS/NEP-2020 and subsequent approval from Academic Council. This is to certify that the syllabus is 100% revised.

Dr. Anu Singla
HOD

Registrar
Bundelkhand University
JHANSI

Dr. ANU SINGLA
HEAD
INSTITUTE OF FORENSIC SCIENCE
& CRIMINOLOGY
Bundelkhand University, JHANSI-284128

बुन्देलखण्ड विश्वविद्यालय
झाँसी

विभाग.....

संचिका संख्या.....

टिप्पणी एवं आदेश

Summary

Minutes of BOS - Forensic Science

Date - 25th June, 2022.

On dated 25th June, 2022 at 2-00 pm, the Board of studies meeting was conducted and the following members were present in the meeting

1. Prof. R.K. Saini, Deen Science / Convenor
2. Dr. Harsh Sharma, Former Director of SFSL - (Online Attended)
3. Sh. Bhoori Singh, Director Incharge, RFSL, Jhansi
4. Dr. Anu Singla, Head, Forensic Deptt.
5. Dr. Vijay Yadav, Assistant Professor
6. Ms. Saurabh Saxena, Student - (Alumni)
7. Ms. Kavita Yadav, Alumni.

The following decisions were taken in the meeting

I. In accordance with the letter of State Govt. of Uttar Pradesh, letter no. 401/70-3-2022, Dated 09/02/2022 regarding implementation of NEP-2020 on UG, PG courses; in the BOS of Forensic Science Deptt. the Syllabus of B.Sc (H) Forensic Science and M.Sc. Forensic Science was approved and it was decided to ~~start~~ implement (CBCS) this from 2022 session.

II B.Sc(H) Forensic Science, M.Sc. Forensic Science and PG Diploma Courses 'Examiners' Panel' was approved

III It was also decided in the meeting to start DSE courses (Biotech, Chemistry, Zoology, Bioinformatics, Physics, etc) in the department only.

Dr. ANU SINGLA
HEAD
INSTITUTE OF FORENSIC SCIENCE & CRIMINOLOGY
Bundelkhand University, JHANSI-284128

(Dr. Anu Singla)
Head
Forensic Science

Dr. A. P. J. Abdul Kalam
Institute of Forensic Science & Criminology
Bundelkhand University
Jhansi-284128
Uttar Pradesh

Course Structure and Syllabi

of

B.Sc. (H) Forensic Science and M.Sc. Forensic Science

w.e.f

2022 (Onwards)

B.Sc. (H) in Forensic Science

Dr. APJ Abdul Kalam Institute of Forensic Science & Criminology

Bundelkhand University, Jhansi

2022

Objectives

The Universal Declaration of Human Rights directs the member nations to create such conditions under which the ideals of free human beings, enjoying civil and political freedom from fear and want, can be achieved. The Constitution of India, through its various articles, strives to ensure security and safety of citizens in accordance with the principles of Universal Declaration of Human Rights. However, crime is a violation of these principles. In a country like India, where majority of population is uneducated, social set up is heterogeneous, public- police relations are not very cordial, poverty is rampant and unemployment widespread, it is not surprising that crime rate is increasing exponentially.

If we have to create conditions conducive to harmonious development, we must mitigate the crime rate. This can best be achieved by relying on the support of Forensic Science system. Unfortunately, in our country, Forensic Science is not viewed as a core investigative skill in crime detection. In fact, there is a lack of understanding of the Forensic process itself. It is for this reason that less than 10% of the police cases are, at present, being referred for forensic examination. Less than 5% are solved by the application of Forensic Science. The rest are solved by third degree method – a practice which the human rights organizations will not allow in days to come.

In majority of serious crime cases, hi-tech measures are being adopted by perpetrators of crime. The counter measures have to be more sophisticated to surpass them. This calls for strengthening the foundations of Forensic Science at national level.

The following are the objectives of this course.

1. To emphasize the importance of scientific methods in crime detection.
2. To disseminate information on the advancements in the field of Forensic Science.
3. To highlight the importance of Forensic Science for perseverance of the society.
4. To review the steps necessary for achieving highest excellence in Forensic Science.
5. To generate talented human resource with latest requirements of Forensic Science.
6. To provide a platform for students and Forensic Scientists to exchange views, chalk- out collaborative programs and work in a holistic manner for the advancement of Forensic Science.

PROGRAM OUTCOMES (POs)

At the end of the program the student will be able to:

PO1	Apply theoretical knowledge of principles and concepts of Forensic Science to practical problems.
PO2	Develop approaches with a concern for accuracy and precision in significance to science and technology.
PO3	Identify, formulate and solve scientific problems based on design, experiment, data interpretation and analysis of results
PO4	Investigate various problems and ways to solve which will be very beneficial to society.
PO5	Show ability in using modern tools for design and analysis.
PO6	Work in teams on multi-disciplinary projects in research organizations and industries.
PO7	Build up communication skills, both written and oral, to specialized and non-specialized audiences.
PO8	Develop the ability to critically evaluate theories, methods, principles, and applications ofpure and applied science.

Program Specific Outcomes (PSO)

PSO 1: Learn latest techniques and norms to analyze various evidences at crime scene and laboratory.

PSO2: Analyze crime scene and make decisions regarding investigative techniques, evidence collection and reconstruction of crime professionally

PSO3: Evaluate results of tests performed on exhibits, prepare reports and opine in court of law.

PSO 4: Develop understanding of basic principles and fundamentals of various disciplines like Forensic Ballistics, Questioned Document Examination, Fingerprint Examination, Forensic Psychology, Forensic Biology and Serology etc.

PSO 5: Gain understanding of set-up and functioning of Forensic Science Laboratories.

Course Structure of B.Sc. (H) Forensic Science Category wise

Core Papers: No. of Core Papers: 14 **Credit: 88**

Course Code	Course Title	Lecture (L) Hours Per Week	Tutorial (T) Hours Per Week	Practical (P) Hours Per Week	Total Credits (C)	Semester
DSC I	Introduction to Forensic Science and Criminal Law	6	-	-	6	I
DSC II	Crime Scene Investigation	4	-	4	6	I
DSC III	Criminology & Forensic Psychology	6	-	-	6	II
DSC IV	Forensic Ballistics & Explosives	4	-	4	6	II
DSC V	Forensic Chemistry	4	-	4	6	III
DSC VI	Instrumental Methods	4	-	4	6	III
DSC VII	Questioned Document Examination	4	-	4	6	IV
DSC VIII	Fingerprint Examination	4	-	4	6	IV
DSC IX	Forensic Biology	4	-	4	6	V
DSC X	Forensic Serology	4	-	4	6	V
DSC XI	Forensic Medicine & Anthropology	4	-	4	6	V
DSC XII	Forensic Physics & Computer Forensic	4	-	4	6	VI
DSC XIII	Forensic Toxicology	4	-	4	6	VI
DSC XIV	Ethics and Practice of Forensic Science	6	-	-	6	VI
	Project/ Lab Visit/ Training	-	-		4	VI

Discipline Specific Elective (DSE): No. of DSE papers: 04 **Credit: 24**

DSE I	To be chosen by the Student from the Repository of Discipline Specific Elective Courses	4	-	4	6	I
DSE II		4	-	4	6	II
DSE III		4	-	4	6	III
DSE IV		4	-	4	6	IV

Generic Elective (GE): No. of GE papers: 02 **Credit: 8**

GE I	To be chosen by the Student from the Repository of General Elective Courses	4	-		4	I/II
GE II		4	-		4	III/IV

Skill Enhancement Courses (SEC): No. of SEC papers: 04 **Credit: 12**

SEC I	To be chosen by the Student from the Repository of Skill Enhancement Courses				3	I
SEC II		-	-	-	3	II
SEC III					3	III
SEC IV					3	IV

Co-Curricular Courses: No. of papers: 06 **Credit: ZERO**

VAC I	Food and Nutrition	4	-	-	-	I
VAC II	First Aid and Health	4	-	-	-	II
VAC III	Human Values and Environment Studies	4	-	-	-	III
VAC IV	Physical Education and Yoga	4	-	-	-	IV
VAC V	Analytic Ability and Digital Awareness	4	-	-	-	V
VAC VI	Communication Skills and Personality Development or Character Building	4	-	-	-	VI

Repository of Discipline Specific Elective (DSE) and General Elective Subjects (GE)

DSE	GE	
Environmental Science	Traditional Knowledge in Indian Medicine and Medicinal Plants	Village and Panchayatiraj
Biotechnology	Fruits and Vegetable Cultivation and Management	Tools and Techniques in Bioinformatics
Chemistry	Disaster Management	Content Writing
Mathematics	Entrepreneurship	Cinema and Society
Home Science	Business Economics	Ramayan me Samrik Sanskriti
Biology	Political Thinkers Western and Indian	Urban Development and Economic Growth
Geology	Indian National Movement	Non-Conventional Energy Resources
Food Technology	Nationalism in India	Cyber Crime (Cryptography)
Agriculture Microbiology	Ghandhian Philosophy	Drinking Water Quality Assessment
Microbiology	Tribal Culture	Water Conservation and River Linking
Physics	Social Security	Energy and Environment
Biochemistry	Indian Arts and Culture	Hindi Shahitya ka Itihaas
Computer Science		

Statistics		

Repository of Skill Enhancement Courses (SEC)

Questioned Document and Hand Writing Examination	Clinical Diagnostic	Rural Development
Vedic Math	Bakery and Value Added Production	Community Health
Astrology	Telly	Health and Hygiene
Gem Stone and Dimensional Stone	Food Processing	Organic Farming
Computer Hardware & Networking	Industrial Microbiology	Desktop Printing
Communication and Soft Skill	Photography	Multimedia
Tour Guide & Heritage	Chemical Sale and Marketing Management	Soft Tissue Manipulation: Therapeutic Massage
Hospital Management	Seed Science and Technology	

Total Credit

Core (DSC)	Discipline Specific Elective (DSE)	General Elective (GE)	Skill Enhancement (SEC)	Total Credit
88	24	08	12	132

B.Sc. (H) Forensic Science

Table 1: Core Course (DSC)

Year	Semester	Paper(DSC)	Paper No.	Title of Paper
First	I	Major I	DSC I	Introduction to Forensic Science and Criminal Law
		Major II	DSC II	Crime Scene Investigation
	II	Major III	DSC III	Criminology & Forensic Psychology
		Major IV	DSC IV	Forensic Ballistics & Explosives
Second	III	Major V	DSC V	Forensic Chemistry
		Major VI	DSC VI	Forensic Toxicology
	IV	Major VII	DSC VII	Forensic Physics & Computer Forensic
		Major VIII	DSC VIII	Instrumental Methods
Third	V	Major IX	DSC IX	Forensic Biology
		Major X	DSC X	Forensic Serology
		Major XI	DSC XI	Forensic Medicine & Anthropology
	VI	Major XII	DSC XII	Questioned Document Examination
		Major XIII	DSC XIII	Fingerprint Examination
		Major XIV	DSC XIV	Ethics and Practice of Forensic Science

Table 2: Elective Courses (DSE)

S.No.	Major (DSE)
1.	Environmental Science
2.	Biotechnology
3.	Chemistry
4.	Mathematics
5.	Home Science
6.	Biology
7.	Geology
8.	Food Technology
9.	Agriculture Microbiology
10.	Microbiology
11.	Physics
12.	Biochemistry
13.	Computer Science
14.	Statistics

Table 3: Minor I (GE)

(Select one subject for first year and other subject for second year)

S.No.	Minor I (Subjects from Other Faculty-GE)
1.	Traditional Knowledge in Indian Medicine and Medicinal Plants
2.	Fruits and Vegetable Cultivation and Management
3.	Disaster Management
4.	Entrepreneurship
5.	Business Economics
6.	Political Thinkers Western and Indian
7.	Indian National Movement
8.	Nationalism in India
9.	Ghandhian Philosophy
10.	Tribal Culture
11.	Social Security
12.	Indian Arts and Culture
13.	Village and Panchayatiraj
14.	Tools and Techniques in Bioinformatics
15.	Content Writing
16.	Cinema and Society
17.	Ramayan me Samrik Sanskriti
18.	Urban Development and Economic Growth
19.	Non-Conventional Energy Resources
20.	Cyber Crime (Cryptography)
21.	Drinking Water Quality Assessment
22.	Water Conservation and River Linking
23.	Energy and Environment
24.	Hindi Shahitya ka Itihaas

Table 4: Minor II (SEC)

(List of Skill Enhancement Courses: Select one course in each semester for first two year i.e. Semester I, II, III and IV)

Minor II (Skill Enhancement Courses- SEC)			
1.	Questioned Document and Hand Writing Examination	13.	Industrial Microbiology
2.	Vedic Math	14.	Photography
3.	Astrology	15.	Chemical Sale and Marketing Management
4.	Gem Stone and Dimensional Stone	16.	Seed Science and Technology
5.	Computer Hardware & Networking	17.	Rural Development
6.	Communication and Soft Skill	18.	Community Health
7.	Tour Guide & Heritage	19.	Health and Hygiene
8.	Hospital Management	20.	Organic Farming
9.	Clinical Diagnostic	21.	Desktop Printing
10.	Bakery and Value Added Production	22.	Multimedia
11.	Telly	23.	Soft Tissue Manipulation: Therapeutic Massage
12.	Food Processing		

Table 5: Minor III

(Co-Curricular Courses)

S.No.	Course Paper	Semester
1.	Food and Nutrition	Semester I
2.	First Aid and Health	Semester II
3.	Human Values and Environment Studies	Semester III
4.	Physical Education and Yoga	Semester IV
5.	Analytic Ability and Digital Awareness	Semester V
6.	Communication Skills and Personality Development or Character Building	Semester VI

B.Sc. (H) in Forensic Science

Dr. APJ Abdul Kalam Institute of Forensic Science & Criminology

Bundelkhand University, Jhansi

2022

Semester –wise Titles of the Papers in U.G. Program (Forensic Science)

Semester	Subject Code	Subject Title	Credits	Marks		
				Int.	Ext.	Total
1st Semester	DSC – I	Introduction to Forensic Science and Criminal Law	6	25	75	100
	DSC – II	Crime Scene Investigation	4	25	75	100
	P – I	Practical (DSC II)	2	25	75	100
	DSE– I	Student has to choose from Repository of DSE	4	25	75	100
	P – II	Practical (DSE I)	2	25	75	100
	GE - I	Student has to choose from Repository of GE	4	25	75	100
	SEC - I	Student has to choose from Repository of SEC	3	25	75	100
	VAC - I	Food and Nutrition (as per ordinance)	VAC			
			25			**700**
2nd Semester	DSC –III	Criminology & Forensic Psychology	6	25	75	100
	DSC – IV	Forensic Ballistics and Explosives	4	25	75	100
	P – III	Practical (DSC IV)	2	25	75	100
	DSE– II	Student has to choose from Repository of DSE	4	25	75	100
	P – IV	Practical (DSE II)	2	25	75	100
	SEC – II	Student has to choose from Repository of SEC	3	25	75	100
	VAC - II	First Aid and Health (as per ordinance)	VAC			
			21			**600**
3rd Semester	DSC – V	Forensic Chemistry	4	25	75	100
	DSC – VI	Instrumental Methods	4	25	75	100
	P – V	Practical (DSC V & VI)	4	25	75	100
	DSE– III	Student has to choose from Repository of DSE	4	25	75	100
	P – VI	Practical (DSE III)	2	25	75	100
	GE – II	Student has to choose from Repository of GE	4	25	75	100
	SEC – III	Student has to choose from Repository of SEC	3	25	75	100
	VAC - III	Human Values and Environmental Studies (as per ordinance).	VAC			
			25			**700**

4th semester	DSC – VII	Questioned Document Examination	4	25	75	100
	DSC – VIII	Fingerprint Examination	4	25	75	100
	P – VII	Practical (DSC VII & VIII)	4	25	75	100
	DSE– IV	Student has to choose from Repository of DSE	4	25	75	100
	P – VIII	Practical (DSE IV)	2	25	75	100
	SEC – IV	Student has to choose from Repository of SEC	3	25	75	100
	VAC - IV	Physical Education and Yoga (as per ordinance).	VAC			
			21			**600**
5th Semester	DSC – IX	Forensic Biology	4	25	75	100
	DSC – X	Forensic Serology	4	25	75	100
	DSC – XI	Forensic Medicine and Anthropology	4	25	75	100
	P – IX	Practical (DSC IX, X, XI)	6	25	75	100
	VAC – V	Analytic Ability and Digital Awareness (as per ordinance).	VAC			
			18			**400**
6th Semester	DSC – XII	Forensic Physics and Computer Forensics	4	25	75	100
	DSC – XIII	Forensic Toxicology	4	25	75	100
	DSC – XIV	Ethics and Practice of Forensic Science	6	25	75	100
	P – X	Practical (DSC XII)	2	25	75	100
	P -XI	Practical (DSC XIII)	2			
		Laboratory Visit/Training/ Police Station Visit/ Court Room Visit	4		100	100
	VAC – VI	Communication Skills and Personality Development or Character Building (as per ordinance).	VAC			
			22			**500**
		Total	132			**3500**

B.Sc. (H) Forensic Science, Semester I

Paper I

Introduction to Forensic Science and Criminal Law

(Theory)

Program/Class: Certificate	**Year: First**	**Semester: First**
Subject: Forensic Science		
Course Code: DSC I	**Course Title: Introduction to Forensic Science and Criminal Law (Theory)**	

Course Objective

This course would introduce the students to Forensic Science and its role in the investigative system. The students would be appraised about the Functions and Principles of Forensic Science, its historical development and the different types of evidences encountered in the field of Forensic Science. They would also acquire knowledge regarding functions and services provided by the Forensic Laboratories.

Course Outcome

CO 1*:* The significance of Forensic Science to human society.
CO 2: The divisions in a Forensic Science laboratory.
CO 3: The working of the Forensic establishments in India and abroad.
CO 4: The fundamental principles and functions of Forensic Science.
CO 5: To gain knowledge about law of evidence, different laws related to interrogation.
CO 6: To understand about the criminal justice system and various sections under IPC, CrPC and Indian Evidence Act.

Credits: 6	**Core Compulsory / Major I**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 90

Units	**Topic**	**No. of Lectures**
I	**Development and Growth of Forensic Science** Definition, Laws and Principles, Historical Development of Forensic Science, Need, Function and Scope of Forensic Science in Present Scenario. Branches of Forensic Science.	**10**
II	**Forensic Science Laboratories** Historical Development and Growth of Forensic Science Laboratories in India – Central and State Level Laboratories, Services and Functionalities provided by various FSLs, Various Divisions of the FSL. Mobile Forensic Science Laboratory: its Functions and Utility. Introduction to Various Institutions: IITR, CCMB, CDFD, NCRB, CDTS.	**10**

III	**Law of Evidence** Evidence, Fact, Types, Testimonial and Real Evidence, Evidence in Enquiry and Trial, First Information Report, Interview and Interrogation of the Criminals, Witness, Types of Witnesses, Admissibility of the Evidence in the Court.	**10**
IV	**Indian Judiciary and Criminal Justice System** Hierarchy and Powers of the Court, Introduction to Criminal Justice System, Process and Parts of Criminal Justice System, Agencies involved in Crime Investigation, Medico-legal Experts, Judicial Officers. Court Procedure: Examination in Chief, Cross Examination and Re-examination. Court Testimony: Admissibility of Expert Testimony Police: State and Central level, Role and Function of Police, Police and Forensic Scientist relationship.	**10**
V	**Legal Provisions Related to Forensic Science** Constitution of India: Preamble, Article 20, 21, 22 Indian Penal Code: Introduction Offences against Person – Sections 299, 302, 304B, 306, 307, 319, 320, 326, 339, 340, 351, 359, 362, 375, 376, 377 Offences against Property- Sections 378, 383, 390, 499 Indian Evidence Act- Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 159. Criminal Procedure Code: Sections 291, 292, 293.	**20**

Suggested Readings

Text Books

1. Basu, S. *The History of Forensic Science in India.* 1st ed. Taylor & Francis. (2021).
2. James, S.H. and Nordby, J.J. & Bell, S. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. 4th ed. CRC Press: USA; (2015).
3. Massey, R. *Encyclopaedia of Forensic Science*. Kaufman Press: India (2022).
4. Nanda, B.B. and Tiwari, R.K. Forensic Science in India- A Vision for the Twenty First Century. Select Publisher: New Delhi. (2014).
5. Saferstein, R. & Roy, T. *Criminalistics -An Introduction to Forensic Science*. 13th ed. Pearson: USA. (2021).
6. Seigel, J.A., Saukko, P.J. & Knupfer, G.C. *Encyclopedia of Forensic Science vol. I, II& III*. Academic Press: United States; (2000).
7. Sharma, B.R. *Forensic Science in Criminal Investigation and Trails*. 6th ed. Universal Law Publishing. (2019).
8. The Code of Criminal Procedure (1973), Bare Act, Universal Law Publication, 2022 edition.
9. The Constitution of India, Bare Act, Universal Law Publication, 2022 edition.
10. The Indian Evidence Act (1872), Bare Act, Universal Law Publication, 2022 edition.
11. The Indian Penal Code (1860), Bare Act, Universal Law Publication, 2022 edition.

Reference Books

1. Ahuja, R. *Criminology*. Rawat Publication: Jaipur. (2000).
2. Aitken, C.G.G. and Stoney, D.A. *The Use of Statistics in Forensic Science*. Ellis Harwood Limited: England; (1991).
3. Arrigo, B.A. *Introduction to Forensic Psychology*. Academic Press: London. (2000).
4. Bag, R.K. *Supreme Court on Criminal Law*. 4th ed. Asia Law House. (2021).
5. Bell, W.R. *Practical Criminal Investigation in Correctional Facilities*. CRC Press: London. (2001).
6. Bennett W. W. and Hass K.M. *Criminal Investigation*. 8th ed. Wordsworth Thompson Learning: (2006).
7. Bridges, B.C. *Criminal Investigation, Practical Fingerprinting, Thumb Impressions, Handwriting Expert Testimony, Opinion Evidence*. University book Agency: Allahabad. (2000).
8. Deb, R. *Criminal Justice*. The Law Book Co. Pvt. Ltd: Allahabad. (1998).
9. Dehaan, J.D.& Icove, D.J.*Kirk's Fire Investigation*. 7th ed. Prentice Hall. (2011).
10. Eckert, W.G.& James S.H.*Interpretation of bloodstain evidence at crime scene*.2nd ed. CRC Press, Florida. (1998).
11. Fisher, B.A.J. & Fisher, D.R. *Techniques of Crime Scene Investigation*. 9th ed. CRC Press. (2022)
12. Gross, H. *Criminal Investigation- A Practical Handbook for Magistrates, Police Officers and Lawyers*. Edizioni Savine (2020).
13. Hess, A.K. and Weiner, I.B. *Handbook of Forensic Psychology* 4th ed. John Wiley & Sons: (2014).
14. James S.H. *Scientific and Legal Application of Blood Stain Pattern Analysis*. CRC Press: Florida. (1998).
15. Kleiner, M. *Handbook of Polygraph Testing*. Academic Press. San Diego. (2002).
16. Lal, R and Lal, D. *The Indian Panel Code*. 36thed. Lexis Nexis. (2022).
17. Lyman M.D. Criminal Investigation- The Art and the Science. Pearson Education: India. (2013).
18. Meguire, M., Morgan, R. and Reiner, R. *The Oxford Handbook of Criminology* 6th ed. Oxford University Press: New York; (2017).
19. Nicharrs, J. *Investigative Forensic Hypnosis*: CRC Press LLC; (1999).
20. Nordby, J.J. *Dead Reckoning-The Art of Forensic Detection*. CRC Press LLC. (2018).
21. Shapiro, D.L. *Forensic Psychology Assessment an Investigative Approach*. Allyn and Bacon Publisher. (1991).
22. Swanson, C.R., Territo, L.I. and Taylor, R.W. *Police Administration: Structures, Processes and Behaviour*. 9th ed. Pearson: USA. (2016).
23. Turrey, B.E. *Criminal Profiling- An Introduction to Behavioural Evidence Analysis*. Academic Press: London. (1999).

E-books (Kindle Edition)

1. Harris, H.A. & Lee, H.C. *Introduction to Forensic Science and Criminalistics*. 2nd Ed. CRC Press. (2019).
2. Jones, E. *"Crash Course Criminalistic: Crime Scene-analysis, Pathology, Forensic Science*. Tredition. (2016).

Web Sources (Open Learning Source)

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistic

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net

B.Sc. (H) Forensic Science, Semester I
Paper II
Crime Scene Investigation
(Theory)

Program/Class: Certificate	**Year: First**	**Semester: First**
Subject: Forensic Science		
Course Code: DSC II	**Course Title: Crime Scene Investigation (Theory)**	

Course Objective

This course shall provide the students necessary foundation to understand the various steps of crime scene investigation. Students shall get a detailed understanding of handling of evidences. Additionally, case studies of various cases shall be reviewed to ensure the student grasps the objectives being reviewed and to enhance the learning environment.

Course Outcome

CO 1: To understand the basic concepts and significance of crime scene.
CO 2: Develop an understanding of the scientific principles of crime scene investigation including proper evidence handling.
CO 3: To develop the skill to critically evaluate the various types of cases.
CO 4: To evaluate and interpret crucial information from various types of trace evidences.
CO 5: To develop the expertise in crime scene reconstruction by the help of latest techniques.

Credits: 4	**Core Compulsory / Major II**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Units	**Topics**	**No. of Lectures**
I	**Crime Scene** Introduction, Importance, Types: Indoor and Outdoor, Primary and Secondary, Conveyance Crime Scene. Physical Evidences: Importance and Types of Physical Evidences.	10
II	**Crime Scene Management** Initial Response, Role of First Responding Officer, Duty Management, Role and Qualities of an Investigating Officer, Role of Forensic Scientists, Forensic Doctors, Fire Brigade and Judiciary. **Securing the Scene:** Procedure and Precautions **Searching Methods:** Types and Applications **Recording the Scene:** Forensic Photography, Forensic Videography, Sketching, Types and Procedure, Note Making.	**15**

	Collection, Preservation and Packaging: Various Methods of Collection, Preservation and Packaging for different evidences. **Chain of Custody and Forwarding:** Significance of Chain of Custody, Forwarding Letter.	
III	**Investigation & Examination of Various Types of Cases** (a) Murder (b) Rape (c) Burglary (d) Railway &Air Crashes (e) Road Accidents (f) Arson	**10**
IV	**Trace Evidences** Location, Collection & Evaluation of Various Types of Trace Evidences: Paint, Soil, Glass, Detective dyes, GSR. **Tool Marks** Classification of Tool Marks. Forensic Importance of Tool Marks. Collection, Preservation and Matching of Tool Marks.	**15**
V	**Forensic Photography** Photography: Basic Principles and Techniques, Exposing, Developing and Printing, Modern Developments in Photography, Digital Photography, Videography/High speed Videography, Crime Scene and Laboratory Photography. **Advances in Crime Scene Investigation** 3-D Scanning of the Scene, Introduction to Biosensors, Reconstruction of the Scene. Portable Devices for Crime Investigation.	**10**

Suggested Readings

Text Books

1. Bevel, T. & Gardener, R.M. *Bloodstain Pattern Analysis with an Introduction to Crime Scene Reconstruction*. 3rd ed. CRC Press. (2008).
2. Fisher, B.A.J. & Fisher, D.R. *Techniques of Crime Scene Investigation*. 9th ed. CRC Press. (2022)
3. James, S.H. and Nordby, J.J. & Bell, S. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. 4th ed. CRC Press: USA; (2015).
4. Massey, R. *Encyclopaedia of Forensic Science*. Kaufman Press: India (2022).
5. Nabar, B.S. *Forensic Science in Crime Investigation*. 3rd ed. Asia Law House. (2013)
6. Nanda, B.B. and Tiwari, R.K. Forensic Science in India- A Vision for the Twenty First Century. Select Publisher: New Delhi; (2014).
7. Ogle, R. & Plotkin, S. *Crime Scene Investigation and Reconstruction*. 4th ed. Pearson. (2017)
8. Saferstein, R. & Roy, T. *Criminalistics -An Introduction to Forensic Science*. 13th ed. Pearson: USA. (2021).
9. Seigel, J.A., Saukko, P.J. & Knupfer, G.C. *Encyclopedia of Forensic Science vol. I, II& III*. Academic Press: United States; (2000).
10. Sharma, B.R. *Forensic Science in Criminal Investigation and Trails*. 6th ed. Universal Law Publishing. (2019).
11. Sharma, B.R. *Scientific Criminal Investigation*. 2nd ed. Universal Law Publishing. (2016).

Reference Books

1. Ahuja, R. *Criminology*. Rawat Publication: Jaipur; (2000).
2. Aitken, C.G.G. and Stoney, D.A. *The Use of Statistics in Forensic Science*. Ellis Harwood Limited: England; (1991).
3. Arrigo, B.A. *Introduction to Forensic Psychology*. Academic Press: London; (2000).
4. Bag, R.K. *Supreme Court on Criminal Law*. 4th ed. Asia Law House. (2021).
5. Bell, W.R. *Practical Criminal Investigation in Correctional Facilities*. CRC Press: London. (2001).
6. Bennett, W.W. and Hass, K.M. *Criminal Investigation*. 8th ed. Wordsworth Thompson Learning: (2006).
7. Bridges, B.C. *Criminal Investigation, Practical Fingerprinting, Thumb Impressions, Handwriting Expert Testimony, Opinion Evidence*. University book Agency: Allahabad; (2000).
8. Deb, R. *Criminal Justice*. The Law Book Co. Pvt. Ltd: Allahabad. (1998).
9. Dehaan, J.D. & Icove, D.J. *Kirk's Fire Investigation*. 7th ed. Prentice Hall. (2011).
10. Eckert, W.G. & James S.H.*Interpretation of bloodstain evidence at crime scene*.2nd ed. CRC Press, Florida. (1998).
11. Gross, H. *Criminal Investigation- A Practical Handbook for Magistrates, Police Officers and Lawyers*. Edizioni Savine (2020).
12. Hess, A.K. and Weiner, I.B. *Handbook of Forensic Psychology* 4th ed. John Wiley & Sons: (2014).
13. James S.H. *Scientific and Legal Application of Blood Stain Pattern Analysis*. CRC Press: Florida. (1998).
14. Kleiner, M. *Handbook of Polygraph Testing*. Academic Press. San Diego. (2002).
15. Lal, R and Lal, D. *The Indian Panel Code*. 36th ed. Lexis Nexis. (2022).
16. Lyman M.D. Criminal Investigation- The Art and the Science. Pearson Education: India; (2013).
17. Meguire, M., Morgan, R. and Reiner, R. *The Oxford Handbook of Criminology* 6th ed. Oxford University Press: New York; (2017).
18. Nicharrs, J. *Investigative Forensic Hypnosis*: CRC Press LLC; (1999).
19. Shapiro, D.L. *Forensic Psychology Assessment an Investigative Approach*. Allyn and Bacon Publisher: (1991).
20. Swanson, C.R., Territo, L.I. and Taylor, R.W. *Police Administration: Structures, Processes and Behaviour*. 9th ed. Pearson: USA. (2016).
21. Tilstone, W.J., Hastrup, M.L. & Hald,C. *Fisher's Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2012).
22. Turrey, B.E. *Criminal Profiling- An Introduction to Behavioural Evidence Analysis*. Academic Press: London. (1999).

E-books (Kindle Edition)

1. Harris, H.A. & Lee, H.C. *Introduction to Forensic Science and Criminalistics*. 2nd Ed. CRC Press. (2019).
2. Jones, E. *Crash Course Criminalistic: Crime Scene-analysis, Pathology, Forensic Science*. Tredition. (2016).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester I
Paper III
Crime Scene Investigation
(Practical)

Program/Class: Certificate	**Year: First**	**Semester: Second**
Subject: Forensic Science		
Course Code: P I	**Course Title: Crime Scene Investigation (Practical)**	

Course Objective

The objective of this course is to give practical exposure to the students in the different aspects of Crime Scene Investigation regarding the reconstruction of indoor and outdoor crime scenes including importance, location, collection, packing, forwarding and examination of various trace evidences.

Course Outcome

CO 1: Reconstruction of the indoor and outdoor scene of crimes
CO 2: The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.
CO 3: The tools and techniques for analysis of different types of crime scene evidence.
CO 4: The usefulness of photography and videography for recording the crime scenes.

Credits: 2	**Practical I**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 30

S.No.	**Practical**	**No. of Lectures**
I	To reconstruct a crime scene (outdoor and indoor).	
II	Collection, packing and forwarding of different types of evidences.	
III	To compare soil samples by density gradient method.	
IV	To compare paint samples by physical matching method and thin layer chromatography method.	
V	To compare glass samples by refractive index method.	
VI	To identify and compare tool marks.	
VII	To Compare cloth samples by physical matching.	
VIII	To take photographs using different filters.	
IX	To take photographs of crime scene exhibits at different angles.	
X	To record videography of a crime scene.	
XI	Report Writing	

Suggested Readings

Text Books

1. Ballistics DFS Manual, 2005.
2. Erickson, E. *Criminalistics Laboratory Manual: The Basics of Forensic Investigation.* 1st ed. Routledge. (2013)
3. Miller, M.T. *Crime Scene Investigation Laboratory Manual.* 1st ed. Academic Press. (2013).
4. Mozayani, A. and Noziglia, C. *The Forensic Laboratory Handbook Procedures and Practice.* 2nd ed. Humana Press: India. (2011)
5. Rao, M.S. and Maithil, B.P. *Crime Scene Management: A Forensic Approach.* 3rd ed. Selective & Scientific Books: India. (2018)
6. Thompson, R.B. and Thompson, B.F. *Illustrated Guide to Home Forensic Science Experiments*. O'Reilly Media: USA. (2012).

Reference Books

1. Anderson, T. & Gardener, T. *Criminal Evidence: Principles and Cases*. 9th ed. Wadsworth Publishing Co Inc. (2015).
2. Byrd, M. *Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence.* 1st ed. CRC Press. (2001).
3. Fisher, B.A.J. & Fisher, D.R. *Techniques of Crime Scene Investigation*. 9th ed. CRC Press. (2022)
4. Heard, B.J. *Handbook of Firearms and Ballistics*. 2nd ed. Wiley: England. (2011).
5. James, S.H. and Nordby, J.J. & Bell, S. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. 4th ed. CRC Press: USA; (2015).
6. Saferstein, R. & Roy, T. *Criminalistics -An Introduction to Forensic Science*. 13th ed. Pearson: USA. (2021).
7. Tilstone, W.J., Hastrup, M.L. & Hald, C. *Fisher's Techniques of Crime Scene Investigation*, CRC Press, Boca Raton (2012).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester II

Paper I

Criminology and Forensic Psychology

(Theory)

Program/Class: Certificate	**Year: First**	**Semester: Second**
Subject: Forensic Science		
Course Code: DSC III	**Course Title: Criminology and Forensic Psychology (Theory)**	

Course Objective

This course would introduce the students to the concepts of Criminology and Forensic aspects of Psychology. Students shall get a detailed understanding of various aspects of Crime and Criminology. Additionally, different lie detection techniques have been reviewed to ensure that the students grasp the objectives of lie detection.

Course Outcome

CO 1: To understand the basic concepts of crime and punishment.
CO 2: To develop an understanding of various aspects of criminal behavior along with understanding the concepts of various theories of criminal behavior.
CO 3: Critical analysis and understanding the social aspects of crime.
CO 4: To recognize the elements of juvenile justice along with legal aspects.
CO 5: The importance of psychological assessment in gauging criminal behavior.
CO 6: The critical assessment of advanced Forensic techniques like Polygraphy, Narco analysis and Brain Electrical Oscillation Signatures.

Credits: 6	**Core Compulsory / Major III**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 90

Units	**Topic**	**No. of Lectures**
I	**Crime and Punishment** **Crime:** Definition, Various Types of Crime, Causes and elements of Crime, Prevention of Crime, Difference in Blue and White Collar Crime, Introduction of Cyber Crime. Concept of Punishment, Humanitarian Approach to Concept of Punishment, Capital Punishment in India.	**10**
II	**Criminology and Criminal Behavior** Definition, Historical Perspectives, Concepts of Criminology, Criminology as Science and Art, The field and scope of Criminology, Methods and Techniques in Criminology, Concept and Theories of Criminal Behavior, and Classification of Criminals.	**15**

III	**Social Aspects of Crime** Sociological Aspects of Crime and Criminal in the Society, Social Change and Crime, Organized Crime, Effect of Urbanization and Industrialization, Drugs and Crime.	**10**
IV	**Juvenile Delinquency** Introduction, Nature, Types of Juvenile Delinquents, Factors of Juvenile Delinquency, Juvenile Justice, Juvenile Court, Procedure of Juvenile Court, Counseling of Juvenile Delinquents, Juvenile Justice (Care and Prevention) Act, Juvenile Justice Board.	**10**
V	**Forensic Psychology** Definition, Fundamental concepts, Psychological Assessment and its importance, Psychology of Lying, Psychology of Serial Murderers and Terrorists. **Detection of Deception** Brain Fingerprinting & Narco Analysis: History, Method of Investigation, Significance, Limitations, Legal Aspects and Future perspectives. Polygraphy: History, Procedure of Investigation, Limitations and Legal Aspects.	**15**

Suggested Readings

Text Books

1. Adler, F., Laufer, W. and Meuller, G.O. *Criminology*. 10th ed. McGraw Hill: Boston. (2022).
2. Ahuja, R. *Criminology*. Rawat Publication: Jaipur; (2000).
3. Ellis, L. and Walsh, A. *Criminology – A Global Perspective*. Allyn and Bacon: Boston. (2000).
4. Meguire, M., Morgan, R. and Reiner, R. *The Oxford Handbook of Criminology*. 6th ed. Oxford University Press: New York; (2017).
5. Morris, E.K. and Braukmann, C.J. *Behavioural Approaches to Crime and Delinquency: A Handbook of Application, Research and Concepts*. Plennum Press: USA. (1987).
6. Veeraraghavan, V. *Handbook of Forensic Psychology*. 2nd ed. Selective & Scientific Books: India.

Reference Books

1. Abadinsky, H. *Organized Crime*. 11th ed. Wadsworth Publishing Co Inc. (2020).
2. Bajpai, G.S. *Development without Disorders: Criminological Viewpoints*. Vishwavidyalaya Prakashan. (2002).
3. Ghosh, S.K. and Rustamji, K.F. *Encyclopaedia of Police in India*. Natraj Books: India. (1997).
4. Hess, A.K. and Weiner, I.B. *Handbook of Forensic Psychology* 4th ed. John Wiley & Sons: (2014).
5. Nabar, B.S. *Forensic Science in Crime Investigation*. 3rd ed. Asia Law House. (2013)
6. Nicharrs, J. *Investigative Forensic Hypnosis*: CRC Press LLC; (1999).
7. Paranjape, N.V. *Criminology & Penology*. Central Law Publication. (2019).
8. Shapiro, D.L. *Forensic Psychology Assessment an Investigative Approach*. Allyn and Bacon Publisher: (1991).
9. Whiteley, C. *Criminal Profiling: A Forensic and Criminal Psychology Guide to FBI and Statistical Profiling*. CgD Publishing. (2021).

E-books (Kindle Edition)

1. *An Introduction to Crime and Criminology*. The Open University. (2019).
2. Whiteley, C. *Forensic Psychology (An Introductory).* CGD Publishing. (2020).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester II
Paper II
Forensic Ballistics & Explosives
(Theory)

Program/Class: Certificate	**Year: First**	**Semester: Second**
Subject: Forensic Science		
Course Code: DSC IV	**Course Title: Forensic Ballistics & Explosives (Theory)**	

Course Objective

This course would introduce the students to the types, characteristics and identification of firearms and ammunition. Students will get knowledge about the linkage of firearm and ammunition, the legal aspects involving firearms, determination of range of firing and introduction to exterior ballistics. The information about the explosives is focused towards the understanding the basic concepts of explosion scene.

Course Outcome

CO 1: To understand the historical development and basic concepts of Firearms and Ammunition.
CO 2: To understand the various aspects of internal ballistics.
CO 3: To develop the conceptual understanding of external ballistics.
CO 4: To evaluate and interpret crucial information from firearm injuries and understand the concepts behind linkage of firearm and ammunition.
CO 5: To build up conceptual understanding of explosives and its forensic aspects.

Credits: 4	**Core Compulsory / Major IV**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Units	**Topic**	**No. of Lectures**
I	**Introduction to Fire Arms and Ammunitions** **Firearms**: Definition, Classification of Firearms, Development, working, advantages and disadvantages of: Hand Cannon, Match Lock, Flint Lock, Wheel Lock and Percussion Lock firearms. Characteristics and firing mechanism of different Modern Firearms (Revolver, Pistol, Shot gun, Semi-automatic and Fully automatic firearms), Introduction to country made firearms. **Ammunition:** Definition, Types, Components of Cartridge: Cartridge case, Primer, Propellant, Wads, Projectile.	**15**
II	**Internal Ballistics** Definition, Propellant: Shape and Size of the propellant, Ignition of the propellant, manner of burning, Lock time, Ignition time, barrel time, muzzle velocity, factors affecting muzzle velocity, theory of recoil.	**10**

III	**External Ballistics** Definition, Shape of bullet, Effect of air on trajectory, drag, drop, drift, yaw, Projectile stability, Range: effective range, extreme range.Factors affecting the range of projectile.	**10**
IV	**Wound /Terminal Ballistics** Introduction, Firearm Injuries: Types and Characteristics, Scorching, Burning, Blackening, Cavitation effect, Stopping power, Ricochet, Range determination from different type of firearms (smooth bore and rifled bore). **Firearm- Ammunition Linkage** Identification of bullets, Test fire, Bullet recovery, Comparison of marks on bullets, cartridge case. Gun Shot Residue: Definition, Composition, Location, Collection, Evaluation and Forensic significance.	**15**
V	**Forensic Explosives** Definition, Classification, composition and characteristics, IED, Explosion process, Reconstruction of sequence of events, Post blast residue collection, Forensic examination of various explosive materials.	**10**

Suggested Readings

Text Books

1. Hatcher, J.S., Jury, F.J. and Weller, J. *Firearms Investigation, Identification and Evidence*. Ray Riling Arms Books: Philadelphia. (2006).
2. Heard, B.J. *Handbook of Firearms and Ballistics*. 2nd ed. Wiley: England. (2011).
3. Johari, M. *Identification of Firearms, Ammunition and Firearms Injuries*. BPR&D: New Delhi. (1980).
4. Mathew, J.H. *Firearms Identification*. Springfield: Illinois. (1973).
5. Sellier, K.G. and Kneubuehl, B.P. *Wound Ballistics and the Scientific Background*. Elsevier: London. (1994).
6. Sharma, B.R. *Firearms in Criminal Investigations and Trials*. 5th ed. Universal Law Publishing. (2017).
7. Working Procedure Manual; Chemistry, Explosives and Narcotics, BPR&D Publications: New Delhi. (2000).
8. Working Procedures Manual: Ballistics. BPR&D: New Delhi. (2000).
9. Yinon, J., Zitrin, S., & Belcher, R. *The Analysis of Explosives*. Pergamon. (2013).

Reference Books

1. Boudreau, J.F., Kwan, Q.Y., Faragher, W.E. and Denault, G.C. *Arson and Arson Investigation: Survey & Assessment*. National Institute of Law Enforcement, Dept. of Justice, US Govt. Printing Press: USA. (1977).

2. Dehaan, J.D. & Icove, D.J. *Kirk's Fire Investigation*. 7th ed. Prentice Hall. (2011).
3. DiMaio, M.D. *Gunshot Wounds*. CRC Press: Washington DC. (1999).
4. Evans-Nguyen, K. & Hutches, K. *Forensic Analysis of Fire Debris and Explosives*. 1st ed. Springer. (2019).
5. Heard, B.J. *Forensic Ballistics in Court: Interpretation and Presentation of Firearms Evidence*. 1st ed. Wiley-Blackwell. (2013).
6. Hogg, I.V. Cartridge Guide: *The Small Arms Ammunition Identification Manual*. Arms & Armour Press. (1982).
7. Hogg, I.V. The Cartridges Guide: *A Small Arms Ammunition Identification Manual*. Stackpole Co: Philadelphia. (1982).
8. Jitrin, Y. *Modern Methods & Application in Analysis of Explosives*. John Wiley & Sons: England. (1993).
9. Sinha, J.K. *Forensic Investigation of Unusual Firearms: Ballistic and Medico-Legal Evidence*. 1st ed. CRC Press. (2021).
10. Warlow, T. *Firearms, The Law and Forensic Ballistics*. Taylor& Francis: London. (1996).

E-books (Kindle Edition)

1. Dodd, M.J. *Terminal Ballistics: A Text and Atlas of Gunshot Wounds*. CRC Press. (2005).
2. Davis, T.L. *The Chemistry of Powder and Explosives*. Hauraki Publishing. (2016).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester II
Paper III
Forensic Ballistics
(Practical)

Program/Class: Certificate	**Year: First**	**Semester: Second**
Subject: Forensic Science		
Course Code: P III	**Course Title: Forensic Ballistics (Practical)**	

Course Objective

The objective of this course is to give practical exposure to the students in the different aspects of Forensic Ballistics regarding the various types of firearms and ammunition, examination of cartridge cases, comparison of bullets, various parts of firearms, chemical analysis of explosive residues and Gunshot residues.

Course Outcome

CO 1: Discriminate between different types of firearms.
CO 2: Demonstrate and Practice the various methods of identification of firearms, fired bullets/cartridge cases.
CO 3: Appraise the technique of GSR examination.
CO 4: Construct a relational comparison method for the linkage of firearms with injury pattern.
CO 5: Assemble and correlate the various instrumental techniques with Forensic Ballistic cases.

Credits: 2	**Practical**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 30

S.No.	**Practical**	**No. of Lectures**
I	Identification of firearms, cartridges, bullets, gunpowder, etc.	
II	Examination and comparison of fired bullets – calibre, rifling characteristics, probable type of firearms.	
III	Examination and comparison of fired cartridge cases (calibre, firing pin, breech face, extractor/ ejector marks etc.)	
IV	Determination of shot number from size and weight of shots.	
V	Determination of range of firing.	
VI	Identification of propellants.	
VII	Various Chemical tests GSR and Barrel wash.	

Suggested Readings

Text Books

1. DFS Manual, Forensic Ballistics (2005).
2. Heard, B.J. *Handbook of Firearms and Ballistics*. 2nd ed. Wiley: England; (2011)
3. Johari, M. *Identification of Firearms, Ammunition and Firearms Injuries*. BPR&D: New Delhi; (1980).
4. Mozayani, A. and Noziglia, C. *The Forensic Laboratory Handbook Procedures and Practice*. 2nd ed. Humana Press: India;(2011)

Reference Books

1. Hatcher, J.S., Jury, F.J. and Weller, J. *Firearms Investigation, Identification and Evidence*. Ray Riling Arms Books: Philadelphia; (2006).
2. Hogg, I.V. Cartridge Guide: The Small Arms Ammunition Identification Manual. Arms & Armour Press. (1982).
3. Mathew, J.H. *Firearms Identification.* Springfield: Illinois. (1973).
4. Rao, M.S. and Maithil, B.P. Crime Scene Management a Forensic Approach: Selective & Scientific Books; New Delhi. (2013).
5. Saferstein, R. & Roy, T. *Criminalistics -An Introduction to Forensic Science*. 13th ed. Pearson: USA. (2021).
6. Sellier, K.G. and Kneubuehl, B.P. *Wound Ballistics and the Scientific Background*. Elsevier: London. (1994).
7. Sharma, B.R. *Firearms in Criminal Investigations and Trials*. 5th ed. Universal Law Publishing. (2017).
8. Warlow, T. Firearms, *The Law and Forensic Ballistics*. Taylor& Francis: London. (1996).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester III

Paper I

Forensic Chemistry

(Theory)

Program/Class: Diploma	**Year: Second**	**Semester: Third**
Subject: Forensic Science		
Course Code: DSC V	**Course Title: Forensic Chemistry (Theory)**	

Course Objective

The students would be able to understand the various types of drugs commonly abused along with their presumptive and instrumental analysis. They would know the legal provisions regarding drugs, cosmetics, and adulterated food. They would also know types of beverages and their forensic analysis and also forensic investigation of fire and arson scene evidences.

Course Outcome

CO 1: Forensic Chemistry, Role of Forensic Chemist.
CO 2: Drug of abuse, commonly abused substances, their sign and symptoms.
CO 3: The presumptive and instrumental methods of analyzing commonly abused drugs.
CO 4: Legal provisions related to drug and cosmetic evidences.
CO 5: Food Adulteration Act, Forensic analysis of different beverages.
CO 6: The method of searching, collecting, preserving the evidences in fire scene investigation.
CO 7: The methods of analyzing trace amounts of petroleum products in fire scene evidence.

Credits: 4	**Core Compulsory / Major V**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Units	**Topic**	**No. of Lectures**
I	**Forensic Chemistry** Introduction, Definition, Scope & Significance, Job of Forensic Chemist. Types of cases/exhibits, preliminary screening, presumptive test (color and spot test), micro-chemical methods of analysis, examination procedures involving standard methods and instrumental techniques, analysis of trace evidences, cosmetics and detective dyes.	**15**
II	**Drugs of Abuse** Introduction, Definition, Classification of Drugs of Abuse: Depressants, Stimulants, and Hallucinogens, their administration, sign & symptoms, drugs of abuse in sports, Narcotics Drugs and Psychotropic Substances, Designers Drugs, Date Rape Drugs and their Forensic Examination. Presumptive tests and instrumental analysis of drugs of abuse.	**15**

III	**Legal Provisions** Narcotic Drugs & Psychotropic Substances Act 1985, Prevention of Illicit Trafficking in NDPS Act 1985, Drugs Control Act 1950, Drugs & Cosmetics Act 1940 and various amendments in above mentioned acts.	**10**
IV	**Adulteration in Food and Beverages** Introduction, Definition, Prevention of Food Adulteration Act 1954, Analytical techniques for analysis of exhibits involved in food adulteration. Introduction of Beverages, Classification of Beverages (alcoholic and non-alcoholic beverages, their composition), Country Made and Illicit Liquors and their Forensic Analysis.	**10**
V	**Petroleum Products and Arson** Introduction, Definition, Classification of Petroleum Products. Examination of Petroleum Products: distillation and fractionation, various fractions and their commercial uses, standard methods of analysis of petroleum products in Forensic Exhibits. Introduction and Definition of Arson, Chemistry of fire, Origin and Cause of Fire, Types of Ignitable Liquids, Forensic Investigation of Fire and Arson Scenes, evaluation of clue material, analysis of Fire and Arson exhibits by Instrumental Methods.	**10**

Suggested Readings

Text Books

1. Chalmers, J.M., Edwards, H.G.M., Hargreaves, M.D.*Infrared & Raman Spectroscopy in Forensic Science.* 1st ed. Wiley. (2012).
2. Dave, N.N. *Forensic Chemistry.* 1st ed. Notion Press. (2021).
3. Khan, J.I., Kennedy, T.J. & Christian D.R. *Basic Principles of Forensic Chemistry*. Humana Press. (2012).
4. Maehly, A. and Stromberg, L. *Chemical Criminalistics*. Springer. (1981).
5. Siegel, J.A. *Forensic Chemistry-Fundamental and Applications*. 1st ed. Wiley-Balckwell. (2015).
6. Skoog, D.A., West, D.M. and Holler, F.J. Fundamentals of Analytical Chemistry 6th ed. Saunders College Publishing: (1996).

Reference Books

1. Brown, W. *Drinking, Drugs & Driving Drunk: How Different Drugs Affect the Driving Experience.*2nd ed. William Gladden Foundation Press: (2011).
2. Clarke, E.G.C. and Moffat, A.C. *Clarke's Isolation and Identification of Drugs: In Pharmaceuticals, Body Fluids and Post Mortem Material*. Pharmaceutical Press: (1986).
3. Crown. D.A. *The Forensic Examination of Paints and Pigments*. Thomas. (1968).
4. Cunliffe, F. *Criminalistics and Scientific Investigation.* Prentice Hall: (1980).

5. Lappalainen, J. and Pertulla, P. *Accident Investigation Techniques*. Oshowiki: (2022).
6. Lundquist, F. and Curry, A.S. *Methods of Forensic Science*. Inderscience Publisher: California; (1963).
7. Moenssens, A.A. and Inbaw, F.E. *Scientific Evidence in Criminal Cases*. Foundation Pr: (1986).
8. Sharma, B.R. *Forensic Science in Criminal Investigation & Trials* 6th ed. Lexis Nexis: India. (2019).
9. Winger, G., Woods, J.H. & Hoffman, F.G. *A Handbook on Drug and Alcohol Abuse.* 4th ed. Oxford University Press: London. (2004).

E-books (Kindle Edition)

1. Grossman, M. *Forensic Chemistry: Fundamentals*. DeGruyter Texbooks. (2021).
2. Elkins, K.M. *Introduction to Forensic Chemistry*. CRC Press. (2018).
3. King, L.A. *Forensic Chemistry of Substance Misuse; A Guide to Drug Control*. Royal Society of Chemistry. (2022).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester III
Paper II
Instrumental Methods
(Theory)

Program/Class: Diploma	**Year: Second**	**Semester: Third**
Subject: Forensic Science		
Course Code: DSC VI	**Course Title: Instrumental Methods (Theory)**	

Course Objective

On completion of this course, the students would be able to understand the various instrumental techniques used for analysis of exhibits found at crime scene. They would know the significance of microscopy and chromatographic techniques. They would also know importance of spectroscopic techniques and their Forensic application along with destructive and non-destructive techniques and their applications.

Course Outcome

CO 1: The significance of different instrumental techniques in processing crime scene evidence.
CO 2: The importance of microscopy in visualizing trace evidence and comparing it with control samples.
CO 3: The usefulness of chromatographic techniques for analysis of the crime scenes exhibits.
CO 4: The utility of spectroscopic methods for the identification of different unknown chemical substance.
CO 5: The significance of electrophoresis techniques and their Forensic application.

Credits: 4	**Core Compulsory / Major VI**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Units	**Topic**	**No. of Lectures**
I	**Fundamental of Instrumentation** Introduction, Need of Instrumentation in Forensic Science, Qualitative and Quantitative Analysis, Destructive and Non-destructive Methods, Separation Techniques, Instrument Calibration, Standard Protocols of Handling Instruments (SOPs).	**12**
II	**Optics and Microscopy** Optics: Geometrical Optics, Image Formation, Magnification, Resolution, Lens Aberrations, Distortion of Image and Curvature of Field. Microscopy: History, Introduction, Theory, Basic Principles, Setup and Forensic Applications of Compound, Fluorescence, Polarized, Stereo and Comparison Microscopes. Electron Microscopy: Introduction, Theory, Basic Principles, Structure and	**12**

	Forensic Applications of Electron Microscopy [Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM)]	
III	**Introductory Chromatography** History, Introduction, Definition, Principles of Chromatographic Techniques, Classification of Chromatographic Methods, Adsorption and Partition Chromatography, Application of different Chromatographic Methods in Forensic Science.	**12**
IV	**Introductory Spectroscopy** Spectroscopy, Electromagnetic Radiation, Phenomena of Emission, Absorption, Reflection, Fluorescence, Phosphorescence. Introduction to various destructive and non-destructive techniques, Beer and Lambert's law, UV/Vis, AAS, IR, X-ray and Raman Spectroscopy and their Forensic applications.	**12**
V	**Electrophoresis** Introduction, Basic Principles, Instrumentation & Forensic Applications of various Electrophoresis, Paper Electrophoresis, Cellulose Acetate Membrane Electrophoresis, Gel Electrophoresis, Agrose Gel Electrophoresis, Polyacrylamide Gel Electrophoresis, Sodium dodecyl sulphate (SDS),Two Dimensional Electrophoresis, Capillary Electrophoresis.	**12**

Suggested Readings

Text Books

1. Armstrong, K. *Forensic Analytical Techniques.* Kaufman Press. (2022).
2. Chatwal, G.R. and Anand, S.K. *Instrumental Methods of Chemical Analysis* 5th ed. Himalaya Publishing: Bombay. (2019).
3. Skoog, D.A., West, D.M. and Holler, F.J. *Fundamentals of Analytical Chemistry* 6th ed. Saunders College Publishing: (1996).
4. Stuart, B.H. *Forensic Analytical Techniques*. 1st ed. Wiley. (2013).
5. Wolstenholme, R., Jickells, S. & Forbes, S. *Analytical Techniques in Forensic Science*. 1st ed. Wiley. (2021).

Reference Books

1. Chalmers, J.M., Edwards, H.G.M., Hargreaves, M.D.*Infrared & Raman Spectroscopy in Forensic Science.* 1st ed. Wiley. (2012).
2. Houck, M.M. *Fundamentals of Forensic Science*. Academic Press: (2015).
3. Jickells, S. and Negrusz, A. *Clarke's Analytical Forensic Toxicology*. Pharmaceutical Press. (2008).
4. Kemp, W. *Organic Spectroscopy.* 3rd ed. PALGRAVE: New York. (1991).
5. Lundquist, F. and Curry, A.S. *Methods of Forensic Science*. Inderscience: California. (1963).
6. Robinson, J.W. *Undergraduate Instrumental Analysis*. Marcel Dekker: New York. (1987).

7. Settle, F.A. *Handbook of Instrumental Techniques for Analytical Chemistry*. Prentice Hall: (1997).
8. Stahl, E. *Thin Layer Chromatography: A Laboratory Handbook*. Springer: Berlin. (1969).
9. Willdard, H.H., Merritt, L.L. and Dean, J.A. *Instrumental Methods of Analysis*. 5th ed. Van Nostrand: New York. (1974).

E-books (Kindle Edition)

1. Rouessac, F. & Rouessac, A. *Chemical Analysis: Modern Instrumentation Methods and Techniques.* Wiley. (2022).
2. Ozaki, Y., Huck, C., Tsuchikawa, S. & Engelsen, S.B. *Near-Infrared Spectroscopy: Theory, Spectral Analysis, Instrumentation and Applications.* Springer. (2020).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester III

Paper III

Forensic Chemistry & Instrumental Methods

(Practical)

Program/Class: Diploma	**Year: Second**	**Semester: Third**
Subject: Forensic Science		
Course Code: P V	**Course Title: Forensic Chemistry & Instrumental Methods (Practical)**	

Course Objective

The objective of the course is to give practical exposure to the students regarding the different aspects of analysis of drugs, petroleum, alcohol products using various chemical methods and instrumental techniques.

Course Outcome

CO 1: The students will gain hands-on experience in the analysis of various drugs.
CO 2: The students will gain hands-on experience in the analysis of petroleum products by chemical and instrumental techniques.
CO 3: The students will be learning about the examination of food adulterations.
CO 4: To explore the practical aspects of different microscopic techniques.
CO 5: To develop the practical knowledge about Chromatographic techniques.
CO 6: To build up conceptual practical understanding of spectroscopic techniques.

Credits: 4	**Practical**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

S.No.	Practical	No. of Lectures
I	Physical Examination of Petroleum Products: Kerosene, Diesel and Petrol.	
II	Chemical and UV-Vis Analysis of Cannabis Products.	
III	Analysis of Phenolphthalein in hand wash.	
IV	Examination of Food Adulterants.	
V	Separation of drugs/ink by TLC and measurement of Rf value.	
VI	Color Spot Test/ TLC of Common Drugs of Abuse.	
VII	To determine the presence of Ethanol, Chloroform, Acetone, Methanol in given samples.	
VIII	Test for Non-Volatile Inorganic Anions and Cations.	
IX	Preparation of TLC Plate.	
X	Experimental Working on Compound Microscope.	
XI	Experimental Working on Stereo Microscope.	
XII	Working on UV-Vis Spectroscopy.	
XIII	Working on Electrophoresis.	

Suggested Readings

Text Books

1. DFS Manual, 2005
2. Mozayani, A. and Noziglia, C. *The Forensic Laboratory Handbook Procedures and Practice*. 2nd ed. Humana Press: India;(2011)
3. Teotia, A.K. and Pal, R. *Practical Aspects of Forensic Chemistry*. Selective & Scientific Books: New Delhi; (2013).

Reference Books

1. Dave, N.N. *Forensic Chemistry.* 1st ed. Notion Press. (2021).
2. Khan, J.I., Kennedy, T.J. & Christian D.R. *Basic Principles of Forensic Chemistry*. Humana Press. (2012).
3. Siegel, J.A. *Forensic Chemistry-Fundamental and Applications*. 1st ed. Wiley-Balckwell. (2015).
4. Stuart, B.H. *Forensic Analytical Techniques*. 1st ed. Wiley. (2013).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester IV

Paper I

Questioned Document Examination

(Theory)

Program/Class: Diploma	**Year: Second**	**Semester: Fourth**
Subject: Forensic Science		
Course Code: DSC VII	**Course Title: Questioned Document Examination (Theory)**	

Course Objective

To know the different types of questioned documents, the types of forgery generally encountered. To learn the methods of their detection and examination and handwriting identification. To identify and do analysis of typewritten and printed documents..

Course Outcome

CO 1: Students will be able to delineate the basics of questioned documents.
CO 2: Students will be able to handle, preserve and manage the questioned documents found at the scene of crime.
CO 3: Students will be able to distinguish between the counterfeit and genuine currencies, passports, credit and debit cards.
CO 4: Students will be able to examine, analyze and differentiate various inks, papers and pens used in preparing a document.
CO 5: Students will be able to identify class and individual characteristics, compare and form an opinion about the authorship of handwriting and signatures.

Credits: 4	**Core Compulsory / Major VII**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Units	**Topic**	**No. of Lectures**
I	Document in General: Importance, Classification & Preliminary Examination. Nature and Problems of Document Examination, Care and Custody of Documents, Handling and Packing of Documents. Basic Tools Needed for Forensic Document Examination and their Use.	**12**
II	Procurements of Standards- Admitted / Specimen Writings. Handwriting: Basic Principle of Handwriting Identification, Handwriting Characteristics- General and Individual. Signatures: Characteristics of Genuine and Forged Signatures and their Examination.	**12**
III	Forgery: Definition, Types, Characteristics and their Detection. Disguised Writing and Anonymous Letters: Definition, Characteristics and Identification of Writer. Sequence of Strokes: Definition and Determination of Sequence of Strokes.	**12**

IV	Alteration in the Document: Examination of Erasures, Additions, Overwriting and Obliteration. Decipherment of Secret Writing, Indented and Invisible Writing, Charred Documents. Examination of Counterfeit Currency Notes, Passport, Security Documents, Credit Card, Visa, Seal and other Mechanical Impressions.	**12**
V	Use of digital technology in the perpetration of white-collar crimes and their detection, digitally manipulated and machine generated documents- their nature, examination and reporting as well as evidence impact. Age of Document: Absolute/Relative Age, Determination of Age of Documents by Examination of Printed Matter, Types Script Writing, Signatures, Paper and Ink. Photography of Questioned Documents, Instrumental Techniques used for Document Examinations. Examination of Ink and Paper, ESDA, VSC.	**12**

Suggested Readings

Text Books

1. Bisesi, M.S., Kelly, J.S. and Lindblom, B.S. *Scientific Examination of Questioned Documents-Forensic and Police Science Series*. CRC Press. (2006).
2. Ellen, D., Day, S. and Davies, C. *Scientific Examination of Documents-Methods and Techniques* 4th ed. CRC Press. (2018).
3. Harrison, W.R. *Forgery Detection-A Practical Guide*. Praeger. (1964).
4. Harrison, W.R. *Suspect Documents – Their Scientific Examination*. Burnham Publishing. (1958).
5. Hilton, O. *Scientific Examination of Questioned Documents*. CRC Press: Boca Raton. (1993).
6. Kelly, J.S. & Angel, M.A. *Forensic Document Examination in the 21st Century.* 1st ed. CRC Press. (2020).
7. Lerinson, J. *Questioned Documents: A Lawyer's Handbook*. Academic Press: London. (2000).
8. Mohammed, L.A. *Forensic Examination of Signatures.* Academic Press. (2019).
9. Morris, R. *Forensic Handwriting Identification-Fundamental Concepts and Principles.* 2nd ed. Academic Press: London. (2020).
10. Osborn, A.S. *Ink and Questioned Documents*. Forgotten Books.
11. Osborn, A.S. *Questioned Documents.* 6th ed.Law & justice Publishing Co.: India. (2020).

Reference Books

1. Bates, B.P. *I.S.Q.D.-Identification System for Questioned Documents*. Charles C. Thomas. (1970).
2. Bates, B.P. *Typewriting Identification* I.S.Q.T. Charles C. Thomas. (1971).
3. Bradford, R.R. & Bradford, R.B. *Introduction to Handwriting Examination and Identification.* Rowman & Littlefield. (1992).
4. Convey, V.P. *Evidential Documents*. Charles C. Thomas Publishing. (1978).
5. Gupta, A.K. *Examination of Questioned Documents Forgery Detection & Legal Aspects*. Selective & Scientific Books. (2021).
6. Hardless, H.R. and Rao, C.S. H.R. *Hardless's Disputed Documents, Handwriting and Thumbprint Identification (Profusely Illustrated)*. Low Book Publishing: Allahabad. (1988).
7. Harralson, H.H. and Miller, L.S. *Huber and Headrick's Handwriting Identification-Facts and Fundamentals*. 2nd ed. CRC Press. (2017).

8. Harralson, H.H. *Developments in Handwriting and Signature Identification in the Digital Age*. 1st ed. Routledge. (2012).
9. Kurtz, S. *Graphotypes: A New Slant on Handwriting Analysis*. Treadgold Press. (1989).
10. Osborn, A.S. *The Problem of Proof: Especially as Exemplified in Disputed Documents Trails (Professional/Technical Series)*. Burnham Publishing. (1975).

E-books (Kindle Edition)

1. Olomu, E. *Questioned Document Examination for Investigators*. Kindle Edition. (2022).
2. Harris, H.A. & Lee, H.C. *Introduction to Forensic Science and Criminalistics*. 2nd Ed. CRC Press. (2019).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester IV

Paper II

Fingerprint Examination

(Theory)

Program/Class: Diploma	**Year: Second**	**Semester: Fourth**
Subject: Forensic Science		
Course Code: DSC VIII	**Course Title: Fingerprint Examination (Theory)**	

Course Objective

The objective of the course is to impart knowledge of fingerprints as important physical evidence at the scene of crime. The students would be able to study the manner in which it is developed, identified, classified, collected, packed and forwarded to the Fingerprint Bureau.

Course Outcome

CO 1: To explain the history and development of fingerprints with its importance as evidence.
CO 2: To explain the formation of friction ridges, basic fingerprint pattern types and its interpretation. Different individual characteristics of ridges.
CO 3: To explain the ridge counting and tracing. Method for making an inked specimen of fingerprint.
CO 4: To describe the classification of fingerprints -Henry system, single digit classification and function of Fingerprint Bureau.
CO 5: To explain the latent fingerprint and chance fingerprints in criminal investigation, and describe the various methods of development of fingerprints.

Credits: 4	**Core Compulsory / Major VIII**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Units	**Topic**	**No. of Lectures**
I	**History of Fingerprinting** History and Development of Fingerprints, Important Figures in the Field of Fingerprint, Principles of Fingerprints, Importance, Nature and Location, Fingerprints as Evidence: Its Recognition, Collection and Preservation.	**12**
II	**Introduction to Fingerprints and its Pattern** Biological Development of Fingerprints, Biological Significance of Skin Pattern, Ridge Formation, Fingerprint Patterns, Pattern Areas, General and Individual Characteristics of Fingerprints.	**12**
III	**Classification of Fingerprints** Classification of Fingerprints for Comparison Purposes: Pattern Area, Core, Delta, Type Lines, Poroscopy, Edgeoscopy, Ridge Characteristics, Fingerprint Pattern Types: Essentials and its types of Loop, Arch, Whorl, Composites, Accidental	**12**

	patterns, etc. Classification of Fingerprints: Henry System of Classification, Single Digit Classification, Establishment and Function of Fingerprint Bureau.	
IV	**Recording and Examination of Fingerprints** Ridge Counting and Tracing, Filling and Searching. Method for Making an Inked Specimen of Fingerprint. Taking of Fingerprint from Living and Dead Person. Comparison Protocols: Class and Individual Characteristics (Galton's Details), Different Ridge Characteristics.	**12**
V	**Latent Fingerprints and Presentation of Fingerprint Evidence in the Court** Latent Fingerprints and Chance Fingerprints in Criminal Investigation, Investigating Latent Fingerprints, Various Methods of Development of Fingerprints: Physical (Black and Grey, Fluorescent and Magnetic Powder Method) and Chemical Methods, Fuming Methods, Laser Method, Lifting of Latent Fingerprints. Photography of Latent Traces. Fingerprint as Forensic Evidence, Presentation of Fingerprint Evidence and Testimony in Court.	**12**

Suggested Readings

Text Books

1. Bridges, B.C. *Criminal Investigation, Practical Fingerprinting, Thumb Impressions, Handwriting Expert Testimony, Opinion Evidence.* University book Agency: Allahabad. (2000).
2. Champod, C., Lennard, C.J., Margot, P. & Stoilovic, M. *Fingerprints and Other Ridge Skin Impressions.* 2nd ed. CRC Press. (2016).
3. Chatterjee, S.K.*Speculation in Fingerprint Identification*. Calcutta. (1981).
4. Cowger, J.F. *Friction Ridge Skin: Comparison and Identification of Fingerprints.* CRC Press. (1992).
5. Daluz, H.M. *Fundamentals of Fingerprint Analysis.* 2nd ed. CRC Press. (2021).
6. Hawthorne, M. *Fingerprints: Analysis & Understanding.* 1st ed. CRC Press. (2017).
7. Johary, C.K. *Forensic Science: Identification of Fingerprints.* Asia Law House. (2018).

Reference Books

1. Ashbaugh, D.R. *Quantitative-Qualitative Friction Ridge Analysis: An Introduction to Basic and Advanced Ridgeology*. CRC Press. (1999).
2. Bleay, S.M., Croxton, R.S. & Puit, M.D. *Fingerprint Development Techniques: Theory and Application.* 1st ed. Wiley. (2018).
3. Daluz, H.M. *Courtroom Testimony for Fingerprint Examiners*. 1st ed. CRC Press. (2021).
4. Hoover, J.E. & Grossman, G. *FBI Guide to Fingerprint Identification.* Magic Lamp Press. (2015).
5. Nanda, B.B. and Tiwari, R.K. Forensic Science in India- A Vision for the Twenty First Century. Select Publisher: New Delhi. (2014).
6. Reinhardt, M. *Guide to Fingerprint Identification and Classification*. 2nd ed. Online Business Education. (2016).
7. Saferstein, R. & Roy, T. *Criminalistics -An Introduction to Forensic Science*. 13th ed. Pearson: USA. (2021).
8. Sharma, B.R. *Forensic Science in Criminal Investigation and Trails*. 6th ed. Universal Law Publishing. (2019).

E-books (Kindle Edition)

1. Perkins, D.G. *The Forensic Analysis, Comparison and Evaluation of Friction Ridge Skin Impressions.* Wiley. (2022).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester IV
Questioned Document & Fingerprint Examination
(Practical)

Program/Class: Diploma	**Year: Second**	**Semester: Fourth**
Subject: Forensic Science		
Course Code: P VII	**Course Title: Questioned Document & Fingerprint Examination (Practical)**	

Course Objective

Developing an understanding and application on Practical aspects of Questioned Documents and Fingerprints. Develop an understanding on procedure adopted for examination of different types of questioned documents, the types of forgeries, disguise and their examination along with giving appropriate conclusion on the basis of findings. Brief description on identification, analysis and examinations of various kinds of fingerprints and other impressions that are encountered on crime scenes.

Course Outcome

CO 1: The tools required for examination of questioned documents.
CO 2: The significance of comparing hand writing samples.
CO 3: The importance of detecting frauds and forgeries by analyzing questioned documents.
CO 4: To provide the information about the plain and rolled fingerprints, identification of patterns.
CO 5: To perform the ridge counting and tracing, for individual characterization.
CO 6: To develop and lift the latent fingerprints using powder and chemical methods present at crime scene.

Credits: 4	**Practical**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

S.No.	**Practical**	**No. of Lectures**
I	Identification of Handwriting: General Characteristics, Natural Variations, Fundamental Divergences and Individual Characteristics.	
II	To detect Simulated and Traced Forgeries.	
III	Examination of Additions, Alterations, and Obliterations in the Documents.	
IV	Examination of Mechanical and Chemical use of Erasers on the Documents.	
V	Examination of Indented Handwriting.	
VI	Examination of Writing Inks by TLC/ Paper Chromatography.	
VII	Examination of Sequence of Intersecting Strokes.	
VIII	Examination of Disguised Writings.	
IX	To take Rolled and Plain Fingerprints.	
X	Collection and Preservation of Fingerprint Evidence.	

XI	Analysis of fingerprints with microscopic techniques for the ridge dimensions with the complete identification profiling.	
XII	Development of fingerprints using physical development techniques.	
XIII	Development of fingerprints using different chemical developing techniques.	
XIV	Examination and development of fingerprints on different surfaces.	
XV	To identify the individual characters from fingerprint sample.	
XVI	Using alternative light sources for examination of fingerprints on different surfaces.	

Suggested Readings

Text Books

1. Champod, C., Lennard, C.J., Margot, P. & Stoilovic, M. *Fingerprints and Other Ridge Skin Impressions*. 2nd ed. CRC Press. (2016).
2. Cowger, J.F. *Friction Ridge Skin: Comparison and Identification of Fingerprints*. CRC Press. (1992).
3. Daluz, H.M. *Fundamentals of Fingerprint Analysis*. 2nd ed. CRC Press. (2021).
4. Harrison, W.R. *Suspect Documents – Their Scientific Examination*. Burnham Publishing. (1958).
5. Hawthorne, M. *Fingerprints: Analysis & Understanding*. 1st ed. CRC Press. (2017).
6. Hilton, O. *Scientific Examination of Questioned Documents*. CRC Press: Boca Raton. (1993).
7. Johary, C.K. *Forensic Science: Identification of Fingerprints*. Asia Law House. (2018).
8. Kelly, J.S. & Angel, M.A. *Forensic Document Examination in the 21st Century*. 1st ed. CRC Press. (2020).
9. Mohammed, L.A. *Forensic Examination of Signatures.* Academic Press. (2019).
10. Osborn, A.S. *Ink and Questioned Documents*. Forgotten Books.
11. Osborn, A.S. *Questioned Documents*. 6th ed.Law & justice Publishing Co.: India. (2020).

Reference Books

1. Bates, B.P. *I.S.Q.D.-Identification System for Questioned Documents*. Charles C. Thomas. (1970).
2. Bates, B.P. *Typewriting Identification I.S.Q.T.* Charles C. Thomas. (1971).
3. Bisesi, M.S., Kelly, J.S. and Lindblom, B.S. *Scientific Examination of Questioned Documents-Forensic and Police Science Series*. CRC Press: (2006).
4. Bleay, S.M., Croxton, R.S. & Puit, M.D. *Fingerprint Development Techniques: Theory and Application.* 1st ed. Wiley. (2018).
5. Bradford, R.R. & Bradford, R.B. *Introduction to Handwriting Examination and Identification*. Rowman & Littlefield. (1992).
6. Convey, V.P. *Evidential Documents*. Charles C. Thomas Publishing: (1978).
7. Daluz, H.M. *Courtroom Testimony for Fingerprint Examiners*. 1st ed. CRC Press. (2021).
8. Ellen, D., Day, S. and Davies, C. *Scientific Examination of Documents-Methods and Techniques* 4th ed. CRC Press: (2018).
9. Hardless, H.R. and Rao, C.S. H.R. *Hardless's Disputed Documents, Handwriting and Thumbprint Identification (Profusely Illustrated).* Low Book Publishing: Allahabad; (1988).
10. Harralson, H.H. and Miller, L.S. *Huber and Headrick's Handwriting Identification-Facts and Fundamentals*. 2nd ed. CRC Press: (2017).

11. Harralson, H.H. *Developments in Handwriting and Signature Identification in the Digital Age*. 1st ed. Routledge. (2012).
12. Hoover, J.E. & Grossman, G. *FBI Guide to Fingerprint Identification*. Magic Lamp Press. (2015).
13. Kurtz, S. *Graphotypes: A New Slant on Handwriting Analysis*. Treadgold Press. (1989).
14. Lerinson, J. *Questioned Documents: A Lawyer's Handbook*. Academic Press: London. (2000).
15. Morris, R. *Forensic Handwriting Identification-Fundamental Concepts and Principles.* 2nd ed. Academic Press: London; (2020).
16. Osborn, A.S. *The Problem of Proof: Especially as Exemplified in Disputed Documents Trails (Professional/Technical Series)*. Burnham Publishing. (1975).
17. Reinhardt, M. *Guide to Fingerprint Identification and Classification*. 2nd ed. Online Business Education. (2016).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester V
Paper I
Forensic Biology
(Theory)

Program/Class: Degree	**Year: Third**	**Semester: Fifth**
Subject: Forensic Science		
Course Code: DSC IX	**Course Title: Forensic Biology (Theory)**	

Course Objective

The students would learn the different aspects of Forensic Biology and some very specific areas such as Forensic Botany, Wild Life Forensics, Forensic Microbiology and Forensic Entomology. The students shall also study in detail the Forensic Examination of Hair and Diatoms Samples.

Course Outcome

CO 1: To understand the nature and importance of biological evidences in Forensic Science.
CO 2: To understand the various aspects of Forensic Botany & types of Botanical Evidences and to present comprehensive knowledge of Pollens, Diatoms and its importance in drowning cases.
CO 3: How Wildlife Forensics aid in conserving natural resources.
CO 4: How Forensic Entomology assists in death investigations.
CO 5: Significance of Forensic Microbiology.

Credits: 4	**Core Compulsory / Major IX**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Unit	**Topic**	**No. of Lectures**
I	**Biological Evidence** Introduction, Nature, Preservation, Handling and Importance of Biological Evidences. Hair: Structure of Human Hair, Significance, Nature, Location and Collection. Transfer, Persistence and Recovery of Hair Evidence. Evaluation and Tests for their Identification. Comparison of Human and Animal Hair. Fiber: Types, Classification, Characteristics of Different Fibers, Tests for their Identification.	**12**
II	**Forensic Botany** Botanical Evidences: Introduction, Types, Location, Collection, Evaluation and Forensic Significance. 1. Wood: Types of Wood and their identification and comparison.	**14**

	2. Leaves: Identification of various types of leaves and their anatomy, methods of comparison. 3. Pollens: Structure, function, methods of identification and comparison. 4. Diatoms: Nature, location, structure, extraction from various body tissues, preparation of slides, methods of identification and comparison, Forensic Significance.	
III	**Wild Life Forensics** Introduction and Significance of Wild Life Forensics and Wild Life Protection Act. Protected and Endangered Species of Animals and Plants. Identification and Examination of wild life materials such as skin, fur, bones, nails, horn, teeth, flowers and plants, by conventional and modern methods, Identification of Pug marks of various animals.	**12**
IV	**Forensic Entomology** Introduction and Forensic Significance of Entomology, Insects of Forensic Importance, Collection of Entomological Evidences during Death Investigations, Insect Succession on Carrion and its relationship to determine Time Since Death.	**12**
V	**Forensic Microbiology** Definition, Types and Identification of Bacteria and Viruses of Forensic Importance, Microbial profile as Identification tool and role of Microorganism in Bioterrorism.	**10**

Suggested Readings

Text Books

1. Budowle, B., Schutzer, S. & Breeze, R. *Microbial Forensics*. Academic Press: (2005).
2. Gunn, A. *Essential Forensic Biology*. 3rd ed. Wiley. (2019).
3. Li, R. *Forensic Biology*. 2nd ed. CRC Press. (2015).
4. Linacre, A. *Forensic Science in Wildlife Investigations*. CRC Press: Boca Raton. (2009).
5. Noziglia, C.M. and Siegel, J. *Entomology and Palynology (Forensics: The Science of Crime Solving S.)*. Mason Crest Publisher: (2005).
6. Sharma, H. & Singal, K. *Handbook of Forensic Biology & Forensic Serology*. 1st ed. Selective & Scientific Books. (2022).

Reference Books

1. Byrd, J.H. *Forensic Entomology: The Utility of Arthropods in Legal Investigations*. 2nd ed. CRC Press:(2009).
2. Coyle, H.M. *Forensic Botany: Principles and Applications to Criminal Casework*. 1st ed. CRC Press. (2004).
3. Faegri, K., Iversen, J., Kaland, P.E. and Krzywinski, K. *Textbook of Pollen Analysis.* 4th ed. John Wiley & Sons: New York. (1989).
4. James, S.H. and Nordby, J.J. & Bell, S. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. 4th ed. CRC Press: USA. (2015).

5. Mozayani, A. and Noziglia, C. *The Forensic Laboratory Handbook: Procedures and Practice (Forensic Science and Medicine)*. Humana: (2007).
6. Saferstein, R. & Roy, T. *Criminalistics -An Introduction to Forensic Science*. 13th ed. Pearson: USA. (2021).
7. Sharma, B.R. *Forensic Science in Criminal Investigation and Trails*. 6th ed. Universal Law Publishing. (2019).
8. Sharma, B.R. *Forensic Science in Criminal Investigation and Trails*. 6th ed. Universal Law Publishing. (2019).

E-books (Kindle Edition)

1. Krishnan, S. *Topics in Forensic Biology*. Kindle Edition. (2020).
2. Stevens, C.D. *Clinical Immunology & Serology: A Laboratory Perspective.* 3rd ed. F.A. Davis Company. (2009).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester V
Paper II
Forensic Serology
(Theory)

Program/Class: Degree	**Year: Third**	**Semester: Fifth**
Subject: Forensic Science		
Course Code: DSC X	**Course Title: Forensic Serology (Theory)**	

Course Objective

The Course aims to provide students with brief overview of the various sections of importance of biological fluids including blood as an evidence for criminal investigation. It detail about the difference between secretions and excretions of body fluids and importance of genetic markers for practical skill development.

Course Outcome

CO 1: The student will understand the importance of biological fluids in criminal investigation.
CO 2: To understand & apply the knowledge regarding several tests used in Blood Analysis and Grouping of blood stains.
CO 3: To acquire, understand and apply the basic knowledge of Instrumental Techniques and Methods used in Blood Analysis.
CO 4: To understand the importance of genetic markers .
CO 5: The importance of blood pattern in crime detection.
CO 6: Discuss the importance of DNA Fingerprinting in Forensic science and explain the genetic basis of DNA Fingerprinting.

Credits: 4	**Core Compulsory / Major X**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Units	**Topic**	**No. of Lectures**
I	**Blood as Evidence** Composition and Functions of Blood, Properties of Human Blood. Human Blood Groups: General Principles, Theory of their Inheritance, Blood Group Determination from Fresh Blood. Collection, Preservation and Packing of Blood Evidence.	**12**
II	**Forensic Examination of Blood** Identification (Preliminary and Confirmatory tests), Species of Origin. Individualization: Blood Grouping, Enzyme Typing. **Instrumental Technique:** Spectrophotometric Method, Electrophoresis Methods: Cellulose Acetate Electrophoresis, Immuno-electrophoresis; Chromatographic Methods and Immunological Methods, Determination of Species of Blood:	**12**

	Precipitin Test (Ring test, Immuno-diffusion, Crossed-Over Electrophoresis and others methods.	
III	**Analysis of Biological Fluids** Composition and Examination of Biological Fluids such as Saliva, Semen, Vaginal Fluid, Urine and Sweat, Protection of Biological Evidences, Collection, Packaging, Preservation & Transportation of Biological Evidences.	**12**
IV	**Blood Pattern Analysis** History of Bloodstain Pattern Interpretation, Target Surface Considerations, Size, Shape and Directionality of Blood Stains, Interpretation of Bloodstain on Clothing and Footwear, Documentation and Photography for Bloodstain Pattern Analysis.	**12**
V	**DNA Profiling** Introduction, History of DNA Typing, Human Genetics- Heredity, Alleles, Mutations and Population Genetics, Molecular Biology of DNA, Variations, Polymorphism, DNA Typing Systems- RFLP Analysis, PCR Amplifications, Sequence Polymorphism, Forensic Significance of DNA Profiling.	**12**

Suggested Readings

1. **Text Books**

1. Barris, H. and Hopkinson, D.A. *Handbook of Enzyme, Electrophoresis* Elsevier, North, Holland, New York. (1976).
2. Bokert, W. G. & James, S. H. *Interpretation of Blood Stain Evidence*. Elsevier, New York. (1989).
3. Chowdhari, S. *Forensic Biology*, B P R & D, Govt, of India. (1971).
4. Dunsford, I. and Bowley, C. *Blood Grouping Techniques*, Oliver & Boyd, London. (1967).
5. Gilblet, E. Markers in Human Blood, Davis: Pennsylvania. (1967).
6. Milller, L.E., Stevens, C.D. *Clinical Immunology & Serology: A Laboratory Perspective.* 5th ed. F.A. Davis. (2021).
7. Sharma, H. & Singal, K. *Handbook of Forensic Biology & Forensic Serology*. 1st ed. Selective & Scientific Books. (2022).
8. Tripathi, A & Dwivedi, A.K. *Forensic Serology & Blood Examination.* Selective & Scientific Books. (2012).
9. Turgeon, M.L. *Immunology & Serology in Laboratory Medicine.* 7th ed. Mosby. (2021).
10. Virella, G. *Medical Immunology*. 6th ed. CRC Press. (2019).

Reference Books

1. Barris, H. & Hopkinson, D.A. *Handbook of Enzyme, Electrophoresis* Elsevier, North, Holland, New York. (1976).
2. Beerman, K.E. *Blood Group Serology*, Churchill, and Lincoin, P.J. (1988).
3. Chatterjee, C. *Human Physiology*. (1975).

4. Culliford, B.E. *The Examination and Typing of Blood Stains*. US Dept. of Justice. Washington. (1971).
5. Curry, A. S. *Methods of Forensic Science*. Vol IV, Interscience. New York. (1965).
6. DNA Technology in Forensic Science by Committee on DNA Technology in Forensic Science, Board on Biology, Commission on Life Sciences, National Research council; National Academy Press, Washington, D.C. 1992.
7. Epplen, J.T. & Lubjuhn, T. *DNA Profiling and DNA fingerprinting.* Birkhauser Verlag: Switzerland. (1999).
8. Furley, M.A. & Harrington, J.J. *Forensic DNA Technology*. Indian Edition CRC Press (2020).
9. Harmening, D.M. *Clinical Hematology and Fundamentals of Hemostatis.* 5th ed. F.A. Davis Company. (2009).
10. Kirby, L.T. *DNA Fingerprinting Technology.* Macmillan: London. (1990).
11. Lee, H.C. & Gaensslen, R.E. *DNA and other Polymorphism in Forensic Science*. Year Book Medical Publishers Inc. (1990).
12. Lincoln, P.J. & Thomson, J. *Forensic DNA Profiling Protocols*. Humana Press. (1998).
13. Race, R.R, & Sanger, R. *Blood Groups in Man.* Blackwell Scientific, Oxford. (1975).
14. Saferstein, R. & Roy, T. *Criminalistics -An Introduction to Forensic Science*. 13th ed. Pearson: USA. (2021).
15. Sinden, R.R. *DNA Structure and Function.* Academic Press. (1994).
16. Stanley, J. *Essentials of Immunology & Serology*. S. Chand (G/L) & Company Ltd. (2002).
17. Stern, C. *Principles of Human Genetics*, Freeman, California. (1964).
18. Stites, D.P., Terr, A.I. & Parstow, T.G. *Medical Immunology.* 9th ed. Appleton & Lange. (1997).
19. Wong, R.C., Tse, H.Y. *Drugs of Abuse: Body Fluid Testing*. Humana Press. (2005).

E-books (Kindle Edition)

1. Krishnan, S. *Topics in Forensic Biology*. Kindle Edition. (2020).
2. Stevens, C.D. *Clinical Immunology & Serology: A Laboratory Perspective*. 3rd ed. F.A. Davis Company. (2009).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester V
Paper III
Forensic Medicine & Anthropology
(Theory)

Program/Class: Degree	**Year: Third**	**Semester: Fifth**
Subject: Forensic Science		
Course Code: DSC XI	**Course Title: Forensic Medicine & Anthropology (Theory)**	

Course Objective

This paper includes Forensic Anthropology, Osteology and Odontology. It gives the students the strength of forming a picture with the information that they can retrieved from the bones- demography, race, sex, age etc. It also teaches them complete facial reconstruction and restoration. The facial superimposition and forensic art forms an intrinsic part of this science and of the syllabus here. During the course the student will understand and appreciate the scope of Forensic Medicine**, k**now about different types of injuries and asphyxia deaths, causes and manner of death and their medico legal significance.

Course Outcome

CO 1: Importance of Forensic Anthropology in Personal Identification.
CO 2: Different Techniques of Facial Reconstruction and their Forensic Importance.
CO 3: Significance of Somatoscopy and Somatometry.
CO 4: The importance of Forensic Odontology.
CO 5: The steps involved in processing the death scene.
CO 6: Examine the changes occurring in body after death assisting to reach on conclusion providing scientific fact about changes occurring after death.
CO 7: Interpretation of different type of Injuries and Asphyxial Deaths.

Credits: 4	**Core Compulsory / Major XI**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Units	Topic	No. of Lectures
I	**Forensic Anthropology** Definition, Scope and Objectives, Human Skeleton. Nature, Formation and Identification of Human Bones. Determination of Age, Sex, Stature from Skeletal Material.	**15**
II	**Personal Identification Techniques** Somatoscopy, Somatometery, Osteometery and Craniometery: their Importance in Determination of Age and Sex.	**10**
III	**Facial Reconstruction** Portrait Parle/Bertillon System, Introduction and Importance of Photofit/ Identi Kit System for Facial Reconstruction. Cranio Facial Super Imposition Techniques (Photographic Superimposition, Video-	**10**

	Superimposition, Roentgenographic Superimposition). Use of Somatoscopic and Craniometric methods in Reconstruction.	
IV	**Forensic Odontology** Development, Scope & Role of Forensic Odontology in Mass Disaster. Types of Teeth and their Functions, Determination of Age from Teeth, Dental Anomalies, and their significance in Personal Identification. Bites Marks: Forensic Significance, Collection, Preservation & Photography of Bite Marks, Legal Aspects of Bite Marks.	**10**
V	**Forensic Medicine** Fundamental Aspects and Scope of Forensic Medicine, Forensic Pathology. Medico Legal Aspects of Death, Causes of Death, Determination of Time Since Death. Medico-legal Investigation of Sexual Offences including Examination of Victim and Suspect. Injuries: Types and Classification of Injuries, Anti-mortem and Post-mortem Injuries, Aging of Injuries, Artificial Injuries. Asphyxial Death: Definition, Different Violent Asphyxial Deaths (Hanging, Strangulation, Throttling, Suffocation, Drowning) and their Medico- legal Importance.	**15**

Suggested Readings

Text Books

1. Bardale, R. *Principles of Forensic Medicine & Toxicology*. 3rd ed. Jaypee Brothers medical Publishers. (2021).
2. Beals, R.L. and Hoijer, H. *An Introduction to Anthropology*. Macmillan: New York. (1966).
3. Byers, S.N. *Introduction to Forensic Anthropology*. 5th ed. Routledge. (2016).
4. Langley, N.R. & Tersigni-Tarrant, M.A. *Forensic Anthropology: A comprehensive Introduction.* 2nd ed. CRC Press. (2017).
5. Modi. *A Textbook of Medical Jurisprudence and Toxicology*. 27th ed. Lexis Nexis. (2021).
6. Nath, S. *An Introduction to Forensic Anthropology*. Gyan Publishing House. (1995).
7. Reddy, K.S.N., Murty, O.P. *The Essentials of Forensic Medicine & Toxicology.* 35th ed. Jaypee Brothers Medical Publishers. (2022).
8. Sarmah, M. *Forensic Anthropology.* Global Net Publication. (2022).
9. Stimson, P.G. and Mertz, C.A.*Forensic Dentistry*. CRC Press. (1997).
10. Vij, K. *Text book of Forensic Medicine and Toxicology: Principles and Practice*. Elsevier: India. (2014).

Reference Books

1. Biswas, G. *Review of Forensic Medicine & Toxicology: Including Clinical and Pathological Aspects*. 5th ed. Jaypee Brothers Medical Publishers. (2021).
2. Clement, J.G. & Ranson, D.L. *Craniofacial Identification in Forensic Medicine*. Oxford University Press. (1998).
3. Comas, J. *A Manual of Physical Anthropology*, Charles C. Thomas Publishing: USA. (1960).

4. Cummins, H. & Midlo, C. *Fingerprints, Palms and Soles: An Introduction to Dermatoglyphics*. Dover Publications: USA. (1943).
5. El-Najjar, M.Y. & Mcwilliams, K.R. *Forensic Anthropology: The Structure, Morphology, and Variation of Human Bone and Dentition*. Springfield. (1978).
6. Glaister, J., Rentoul, E. & Smith, H. *Glaister's Medical Jurisprudence and Toxicology*. Churchill Livingston: Edinburgh. (1973).
7. Gray, H. and Williams, P.L. *Gray's Anatomy: The Anatomical Basis of Clinical Practice*. Churchill Livingston: Edinburgh. (1995).
8. Jensen, R.A. *Mass Fatality and Casualty Incidents: A Field Guide*. CRC Press. (1999).
9. Krogman, W.M. And Iscan, M.Y. *Human Skeleton in Forensic Medicine* 2nd ed. Springfield. (1986).
10. Mukherjee, J.B. *Forensic Medicine & Forensic Toxicology*. Academic Publisher. (1981).
11. Roberts, J.A.F. *An Introduction to Medical Genetics*. Oxford University Press: (1965).
12. Taylor, K.T. *Forensic Art and Illustrations*. CRC Press. (2008).
13. Whitaker, D.K. and MacDonald, D.G. *A Color Atlas of Forensic Dentistry*. Wolfe Medical Publishing: London. (1989).

E-books (Kindle Edition)

1. Stark, M.M. *Clinical Forensic Medicine: A Physician's Guide*. 4th ed. Springer. (2020).
2. Christensen, A.M., Passalacqua, N.V. & Bartelink, E.J. *Forensic Anthropology: Current Methods and Practice.* 2nd ed. Academic Press. (2019).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester V
Paper IV
Forensic Biology, Serology & Anthropology
(Practical)

Program/Class: Degree	**Year: Third**	**Semester: Fifth**
Subject: Forensic Science		
Course Code: P IX	**Course Title: Forensic Biology, Serology & Anthropology (Practical)**	

Course Objective

The objective of this course is to give practical exposure to the students in the different aspects of Forensic Biology & Serology analysis and analysis of biological evidences using various chemical and physical methods.

Course Outcome

CO 1: To analyze the recovered blood sample from crime scene
CO 2: To analyze, identify, evaluate & individualize the biological Fluids (urine, semen, saliva, sweat).
CO 3: To identify and examine bite marks and their importance.
CO 4: To determine the age, sex, stature of a persons from different bones.
CO 5: To analyze, identify, evaluate & individualize the hair and fiber.

Credits: 6	**Practical**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 90

S.No.	**Practical**	**No. of Lectures**
I	Determination of Age from Skull Sutures.	
II	Determination of Age from Teeth.	
III	Determination of Sex from Skull.	
IV	Determination of Sex from Pelvis.	
V	Estimation of Stature using Long Bones.	
VI	Recording of Bite marks by Photography & Casting.	
VII	To prepare slides of scale patterns of human hair.	
VIII	To examine human hair for cortex and medulla.	
IX	To identify various type of fibers.	
X	Study of pollen grains of forensic significance.	

XI	Identification of diatoms.	
XII	To identify blood stains.	
XIII	To identify semen stains.	
XIV	To identify saliva stains.	
XV	To determine species of origin from blood.	
XVI	To determine blood group from fresh blood and blood stains.	

Suggested Readings

Text Books

1. Bhasin, M.K. & Chahal, S.M.S. *A Laboratory Manual for Human Blood Analysis*. Kamla-raj Enterprises. (1996).
2. Byers, S.N. *Forensic Anthropology Laboratory Manual.* 4th ed. Routledge. (2016).
3. Dunsford, I. and Bowley, C. *Blood Grouping Techniques*, Oliver & Boyd, London. (1967).
4. Eckert, W.G., & James S.H., *Interpretation of bloodstain evidence at crime scene*, CRC Press, Florida, 1989.
5. Li, R. *Forensic Biology*. 2nd ed. CRC Press. (2015).
6. Sharma, H. & Singal, K. *Handbook of Forensic Biology & Forensic Serology*. 1st ed. Selective & Scientific Books. (2022).

Reference Books

1. Bevel, T. & Gardener, R.M. *Bloodstain Pattern Analysis with an Introduction to Crime Scene Reconstruction*. 3rd ed. CRC Press. (2008).
2. James, S.H. and Nordby, J.J. & Bell, S. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. 4th ed. CRC Press: USA; (2015).
3. Kirk, P.L., *Introduction in crime investigation* (2nd), John Willey and, New York, 1974.
4. Langley, N.R. & Tersigni-Tarrant, M.A. *Forensic Anthropology: A comprehensive Introduction*. 2nd ed. CRC Press. (2017).
5. Saferstein, R. & Roy, T. *Criminalistics -An Introduction to Forensic Science*. 13th ed. Pearson: USA. (2021).
6. Tripathi, A & Dwivedi, A.K. *Forensic Serology & Blood Examination*. Selective & Scientific Books. (2012).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester VI

Paper I

Forensic Physics & Computer Forensics

(Theory)

Program/Class: Degree	**Year: Third**	**Semester: Sixth**
Subject: Forensic Science		
Course Code: DSC XII	**Course Title: Forensic Physics & Computer Forensics (Theory)**	

Course Objective

On completion of this course, the students would be able to develop conceptual understanding of Forensic Physics and handling of Physical Evidences. The basic concepts of handling and examination of various physical evidences are quite important for criminal investigation. The detailed knowledge about the Mobile Forensic and Computer Forensic will be beneficial for understanding concepts of cyber crime and preventive measures.

Course Outcome

CO 1: To understand the basic concepts of Forensic Physics.
CO 2: To know the handling and examination of different types of physical evidences.
CO 3: To know the examination and handling procedure of tools marks.
CO 4: To evaluate and interpret crucial information related to Mobile phone device from its Forensic point of view.
CO 5: To build up conceptual understanding of cyber crime and its preventive measures.

Credits: 4	**Core Compulsory / Major XII**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Units	**Topic**	**No. of Lectures**
I	**Introduction to Forensic Physics** Introduction, Definition, Physical Evidence: Nature, Collection, Preservation and Forwarding for Scientific Examination, General Overview of Instruments used in Forensic Physics. **Speaker Identification** Human Vocal Cord Anatomy, Production of Voice, Speaker and Speech Identification and Authentication, Voice Analysis, Forensic Significance.	**12**
II	**Physical Evidences** Introduction, Definition, Nature, Significance of different types of Physical Evidences. **Glass:** Definition, Composition, Types, Fracture Pattern, Examination, Forensic Significance.	**12**

	Soil: Definition, Types, Examination and Forensic Significance. **Building Material:** Introduction, Cement: Types and Composition, Determination of Adulterants, Analysis of Concrete. **Impressions:** Introduction, Different types of Impressions: Foot Print, Shoe Print, Tyre Impressions, Skid Marks, Preservation, Lifting and Comparison.	
III	**Tool Marks** Introduction, Definition, Types of Tool marks, Class Characteristics and Individual Characteristics, Location, Lifting and Examination of Tool Marks.	**12**
IV	**Mobile Forensics** Introduction, Definition and Principles, Historical Development of Mobile Phones, Mobile Device as Evidence. Process of Mobile Device Forensics: Seizure, Acquisition, Handling & Examination, Reporting.	**12**
V	**Computer Forensics** Introduction, Nature of Digital Evidences, Retrieval and Analysis of Digital Evidence, Computer Security and its relationship to Computer Forensics, Extraction Tools (Autopsy, Encase, Cellebrite UFED etc.), Emergence of Computer Crime: Classification of Computer Crimes, Computer Virus and Types, Characteristics of Computer Crime and Criminals, Prevention from Cyber Crime.	**12**

Suggested Readings

Text Books

1. Bodziak, W.J. *Forensic Footwear Evidence*. CRC Press. (2016).
2. Bodziak, W.J. *Tire Tread and Tire Track Evidence: Recovery and Forensic Examination*. 1st ed. CRC Press. (2008).
3. Caddy, B. *Forensic Examination of Glass and Paint: Analysis and Interpretation*. CRC Press: (2001).
4. Dennis S. *Physics in the Prevention and Detection of Crime*. Contemporary Physics. (1976).
5. Gold, B., Morgan, N. and Ellis, D. *Speech and Audio Signal Processing: Processing and Perception of Speech and Music* 2nd ed. John Wiley and Sons: USA; (2011).
6. Holubova, A., Straus, J. & Slezakova, J. *Forensics and Physics*. Cambridge Scholars Publishing. (2022).
7. Jenkins, F.A. and White, H.E. *Fundamentals of Optics.* 4th ed. Mc Graw Hill Education: India. (2017).
8. Kent, R.D. and Read, C. *Acoustic Analysis of Speech*. Delmarg Cengage Learning: (1992).
9. Marcella, A.J. & Menendez, D. *Cyber Forensics: A Field Manual for Collecting, Examining, And Preserving Evidence of Computer Crimes.* 2nd ed. Auerbach Publications. (2007).
10. Murray, R.C. and Tedrow, J.C.F. *Forensic Geology*. Prentice Hall: New Jersey; (1998).
11. Rose, P. *Forensic Speaker Identification*. Taylor and Francis: London; (2002).

12. Sears, F.W., Zemansky, M.W. & Young, H.D. *University Physics*. 6th ed. Narosa. (2013).
13. Working Procedure Manual: Physics. BPR&D Publication.

Reference Books

1. Carper, K.L. *Forensic Engineering*. CRC Press: (2000).
2. Cassidy, J.M. *Footwear Identification*. Canadian Govt. Publishing Centre: Canada; (1980)
3. DiLisi, G.A. & Rarick, R.A. *Case Studies in Forensic Physics.* Springer International Publishing AG. (2020).
4. Gold, B., Morgan, N. & Ellis, D. *Speech and Audio Signal Processing: Processing and Perception of Speech and Music*. 2nd ed. John Wiley and Sons: USA. (2011).
5. Houck, M.M. *Firearm and Toolmark Examination and Identification*. Academic Press: UK Edition. (2015).
6. Hunter, W. *Solving Crimes with Physics (Solving Crimes withScience: Forensics)*. Mason Crest. (2014).
7. James, S.H. and Nordby, J.J. & Bell, S. *Forensic Science: An Introduction to Scientific and Investigative Techniques*. 4th ed. CRC Press: USA; (2015).
8. Kirk, D.V. *Vehicular Accident Investigation and Reconstruction*: CRC Press: (2000).
9. Noon, R.K. *Forensic Engineering Investigation*. CRC Press: (2000).
10. Petraco, N. *Color Atlas of Forensic Toolmark Identification.* 1st ed. CRC Press. (2010).
11. Rao, M.S. *Crime Scene Management: A Scientific Approach* 3rd ed. Selective & Scientific Books: New Delhi; (2018).
12. Robertson, J., Roux, C. & Wiggins, K.G. *Forensic Examination of Fibres.* 3rd ed. CRC Press. (2017).
13. Saferstein, R. & Roy, T. *Criminalistics -An Introduction to Forensic Science*. 13th ed. Pearson: USA. (2021).

E-books (Kindle Edition)

1. Reddy, N. *Practical Cyber Forensics: An Incident-based Approach to Forensic Investigations*. 1st ed. Apress. (2019).
2. Le-Khac, N. & Choo, K.R. *Cyber and Digital Forensic Investigation: A Law Enforcement Practitioner's Perspective*. Springer. (2020).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester VI

Paper II

Forensic Toxicology

(Theory)

Program/Class: Degree	**Year: Third**	**Semester: Sixth**
Subject: Forensic Science		
Course Code: DSC XIII	**Course Title: Forensic Toxicology (Theory)**	

Course Objective

The objective is to impart to the students' knowledge regarding the practical and theoretical aspects of Forensic Toxicology, various types of poisons, their nature, action, sign & symptoms and standard procedure for investigation of different types of poisoning cases. They would also know the detection and identification of poisons and their medico-legal aspects.

Course Outcome

CO 1: Role of Forensic Toxicologist.
CO 2: The significance of toxicological findings in Forensic Science.
CO 3: The classification of poisons and their mode of actions.
CO 4: The lethal dose, lethal period of different poisons.
CO 5: The different plants and animals poison and their sign and symptoms.
CO 6: The metallic and industrial poisons, their nature and exposure.
CO 7: The different class of insecticides & pesticides and their exposure and medico-legal aspects.

Credits: 4	**Core Compulsory / Major XIII**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 60

Units	**Topic**	**No. of Lectures**
I	**Forensic Toxicology** Introduction, Definition, History & Development, Scope of Forensic Toxicology, Role of Forensic Toxicologist. Significance of Toxicological Findings, Dose-Response Relationship, Lethal Dose, Lethal Period, Fatal Period, LD50, LC50, Tolerance, Collection and Preservation of Toxicological Exhibits in Fatal and Survival Cases, Medico-legal Aspects.	**12**
II	**Poisons** Introduction, Definition of Poison, Classification of Poisons, Action of Poisons, Types of Poisoning: Accidental, Suicidal and Homicidal, Sign & Symptoms of Common Poisoning and their Antidotes, Collection and Preservation of Viscera for various Poisoning Cases, Detection of Poisons.	**12**

III	**Animal and Vegetable Poisons** Introduction, Definition, Nature, Type, Mode of Action, Sign & Symptoms of- Animal Poisons: Snake venom, Scorpions and Cantharides Vegetable Poisons: Dhatura, Oleander, Madar, Abrus precatrious, Castor, Cannabis, Nux vomica, etc. Insect Poison: Arthropods, Arachnida	**12**
IV	**Metallic and Industrial Poisons** Introduction, Definition, Nature, Administration, Sign & Symptoms, Postmortem Findings, Detection and Medico legal Aspects of- Heavy Metals: Arsenic, Mercury, Lead, Cadmium, etc. Mineral Acids: HCl, H_2SO_4, HNO_3, etc. Alkalies: Hydrates and Carbonates of Sodium and Potassium.. CO Poisoning: Signs and Symptoms, Methods of Diagnosis.	**12**
V	**Insecticides and Pesticides** Introduction, Definition, Nature, Administration, Sign & Symptoms, Postmortem Findings, Detection and Medico legal Aspects of- Organophosphorous Compounds, Organochloro Compounds and Carbamates.	**12**

Suggested Readings

Text Books

1. Ambade, V. *Forensic Toxicology: A Comparative Approach*. 2nd ed. CBS Publishers & Distributors Pvt. Ltd. (2021).
2. Curry, A.S. *Analytical Methods in Human Toxicology: Part II*. Wiley VCH. (1986).
3. Curry, A.S. *Poison Detection in Human Organs*. Springer. (1976).
4. Klaassen, C. *Casarett& Doull'sToxicology: The Basic Science of Poisons*. 9th ed. McGraw Hill. (2018).
5. Levine, B.S. & Kerrigan, S. *Principles of Forensic Toxicology.* 5th ed. Springer. (2020).
6. Matsumura, F. *Toxicology of Insecticides*. Springer: New York. (1985).
7. Modi. *A Textbook of Medical Jurisprudence and Toxicology*. 27th ed. Lexis Nexis. (2021).
8. Vij, K. *Text book of Forensic Medicine and Toxicology: Principles and Practice*. Elsevier: India;(2014).

Reference Books

1. Connors, K.A. *A text book of Pharmaceuticals Analysis*. 2nd ed. Wiley: New York. (1975).
2. Curry, A.S. *Advances in Forensic Chemical Toxicology*. CRC Press. (1972).
3. Gosselin, R.E., Hodge, H.C., Smith R.P., Gleason, M.N. *Clinical Toxicology of Commercial Products*. The Williams & Wilkins: Baltimore. (1969).
4. Hodgson, E. *A Textbook of Modern Toxicology*. 4th ed. John Wiley & Sons: Canada. (2010).
5. Stoleman, A. *Progress in Chemical Toxicology*. Academic Press. (2013).
6. Sunshine, I. *Guidelines for Analytical Toxicology Program*. CRC Press. (1950).
7. Sunshine, I. *Handbook of Analytical Toxicology*. CRC Press: Cleveland. (1969).

8. Sunshine, I. *Methods for Analytical Toxicology*, CRC Press: USA. (1975).
9. Swarbrick, J. *Clarke's Isolation and Identification of Drugs*. 2nd ed. Pharmaceutical Press: London. (1986).
10. Turner, W. *Drugs & Poison (Police Evidence Library)*. Aqueduct. (1965).

E-books

1. Grossman, M. *Forensic Chemistry: Fundamentals*. DeGruyter Texbooks. (2021).
2. Elkins, K.M. *Introduction to Forensic Chemistry*. CRC Press. (2018).
3. King, L.A. *Forensic Chemistry of Substance Misuse; A Guide to Drug Control*. Royal Society of Chemistry. (2022).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

Other Web Sources

https://application.wiley-vch.de
www.researchgate.net
http://www.ipu.ac.in

B.Sc. (H) Forensic Science, Semester VI

Paper III

Ethics and Practice of Forensic Science

(Theory)

Program/Class: Degree	**Year: Third**	**Semester: Sixth**
Subject: Forensic Science		
Course Code: DSC XIV	**Course Title: Ethics and Practice of Forensic Science (Theory)**	

Course Objective

The course objective is to develop the ideology of Forensic Professionalism among the students. Students will gain information about the significance of Ethical Issues for the betterment of Criminal Justice System. The ethical guidelines for the researchers will be beneficial for the improvement of research quality.

Course Outcome

CO 1: To develop the ideology of professionalism among the students.
CO 2: To review the significance of ethics among the law enforcement professionals.
CO 3: To understand the value of court room ethics.
CO 4: To develop the ethical practice among the researchers for improving the research quality.
CO 5: To develop awareness of ethical codes among the students and Forensic Professionals.

Credits: 6	**Major XIV**
Max. Marks: 100	**Min. Passing Marks: 40**

Total No. of Lectures: 90

Unit	Topic	No. of Lectures
I	**Forensic Professionalism** Introduction, Ethical Theories, Role of Scientific Expert Witness, Qualification of Scientific Expert Witness, Forensic Professionalism in Teaching and Laboratory.	**12**
II	**Ethics for Law Enforcement Agencies** Introduction, Ethical Role of the Investigator, Ethical Training, Rights of Accused, Unethical Behavior by the Investigator, Police-Expert Relationship.	**12**
III	**Ethics in Court Room** Introduction, Role of Attorney, Attorney-Expert Relationship, Admissibility of Scientific Evidence: The *Frye* Case, The *Daubert* Case, Misconduct in the Court Room: *Duke Lacrosse Case, Joseph Buffy Case.*	**12**
IV	**Ethics in Science and Research** Introduction, Science, Technology and Society, Ethics in Research and Publications, Uncertainty, Measurement of Uncertainty, Misconduct in Research, Ethical Committee and Ethical Approval.	**12**

V	**Codes of Ethics** Definition, Developing Codes of Ethics, Code of Ethics and Conduct, Rule of Professional Conduct, International Forensic Science Professional Codes of Ethics, U.S. Law Enforcement Professional Codes of Ethics.	**12**

Suggested Readings

Text Books

1. Bowen, R.T. *Ethics and Practice of Forensic Science.* 2nd ed. CRC Press (2021)

Reference Books

1. Downs, J.C.U and Swienton, A.R. *Ethics in Forensic Science*. Academic Press: (2012).
2. Shiffman, M.A. *Ethics in Forensic Science and Medicine: Guidelines for the Forensic Expert and the Attorney*. Charles C. Thomas Pvt. Ltd. (2001).

E-Books

1. Barnett, P.D. *Ethics in Forensic Science: Professional Standards for the Practice of Criminalistics.* 1st ed. CRC Press. (2001).

Open Learning Sources

1. https://swayam.gov.in/courses/public
2. http://nptel.ac.in/course.php
3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

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B.Sc. (H) Forensic Science, Semester VI
Forensic Physics & Computer Forensics
(Practical)

Program/Class: Degree	**Year: Third**	**Semester: Sixth**
Subject: Forensic Science		
Course Code: P X	**Course Title: Forensic Physics & Computer Forensics (Practical)**	

Course Objective

To develop practical exposure regarding Forensic Physics and Computer Forensic. The students would aware about the handling and examination procedure of different physical evidences. They would also know about the data extraction procedure and protocols from various devices.

Course Outcome

CO 1: To provide the information about the glass evidence, how to analyze the glass fracture and identification of fractures and sequence.
CO 2: To analyze the soil samples.
CO 3: To analyze the tool marks present at crime scene using different techniques.
CO 4: To develop awareness among students for lifting and handling various impressions.

Credits: 2	**Practical**
Max. Marks: 50	**Min. Passing Marks: 20**

Total No. of Lectures: 30

S.No.	**Practical**	**No. of Lectures**
I	Examination of Soil Samples.	
II	Examination of Glass by Density Gradient Method.	
III	Examination of Glass Fractures.	
IV	Examination of Tool Marks.	
V	Casting and Lifting of various Impressions (Foot Print, Shoe Print, Tyre Impressions, etc.)	
VI	Data Recovery from various Storage Devices.	
VII	Report Writing in Cyber Case.	

Suggested Readings

Text Books

1. DFS Lab Manual, Forensic Physics (2005).
2. Marcella, A.J. & Menendez, D. *Cyber Forensics: A Field Manual for Collecting, Examining, And Preserving Evidence of Computer Crimes*. 2nd ed. Auerbach Publications. (2007).

Reference Books

1. Bodziak, W.J. *Forensic Footwear Evidence*. CRC Press. (2016).
2. Bodziak, W.J. *Tire Tread and Tire Track Evidence: Recovery and Forensic Examination*. 1st ed. CRC Press. (2008).
3. Rao, M.S. *Crime Scene Management: A Scientific Approach* 3rd ed. Selective & Scientific Books: New Delhi; (2018).
4. Hunter, W. *Solving Crimes with Physics (Solving Crimes withScience: Forensics)*. Mason Crest. (2014).
5. DiLisi, G.A. & Rarick, R.A. *Case Studies in Forensic Physics.* Springer International Publishing AG. (2020).
6. Robertson, J., Roux, C. & Wiggins, K.G. *Forensic Examination of Fibres.* 3rd ed. CRC Press. (2017).

Open Learning Sources

1. https://swayam.gov.in/courses/public
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3. https://www.goodreads.com/book/show/779610.Introduction_to_Forensic_Science_and_Criminalistics

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B.Sc. (H) Forensic Science, Semester VI
Forensic Toxicology
(Practical)

Program/Class: Degree	**Year: Third**	**Semester: Sixth**
Subject: Forensic Science		
Course Code: P XI	**Course Title: Forensic Toxicology (Practical)**	

Course Objective

To develop practical exposure regarding Forensic Toxicology. The students would aware about the types of poisons and their toxic effects, characteristics and causes of poisoning, Extraction and analytical techniques used for extraction of Volatile and Non-volatile poison.

Course Outcome

CO 1: Develop TLC for the identification of Insecticides and Pesticides.
CO 2: Perform TLC for the identification of Barbiturates and other drugs.
CO 3: Analyze different poisons by various tests.
CO 4: Identify Volatile and non- volatile poison in given sample.

Credits: 2	**Practical XI**
Max. Marks: 50	**Min. Passing Marks: 20**

Total No. of Lectures: 30

S.No.	**Practical**	**No. of Lectures**
I	To test the presence of Metallic Poison (Lead, Iron, Cu, Arsenic) in given sample.	
II	Identification of Pesticides using TLC for OPCs, OCs, Carbamates.	
III	Identification of Barbiturates (acidic drugs) by using Color Spot Test and TLC.	
IV	Identification of Basic Drugs using TLC.	
V	Analysis of Plant and Vegetable poison - Oleander, Calotropis, Nicotine.	

Suggested Readings

Text Books

1. Mozayani, A. *Forensic Laboratory Handbook Procedure and Practice.* Humana Press. (2011).
2. DFS Manual. (2005).
3. Teotia, A.K. *Practical Aspects of Forensic Chemistry.* Selective and Scientific Books. (2013).

Reference Books

1. Curry, A.S. *Poison Detection in Human Organs*. Springer. (1976).
2. Matsumura, F. *Toxicology of Insecticides*. Springer: New York. (1985).
3. Swarbrick, J. *Clarke's Isolation and Identification of Drugs*. 2nd ed. Pharmaceutical Press: London. (1986).
4. Aggarwal, A. *Textbook of Forensic Medicine and Toxicology*. Avichal Publishing Company. (2019).

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1. https://swayam.gov.in/courses/public
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